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Earnings Losses of Displaced Workers with Stable Labour Market Attachment: Recent Evidence from Canada

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^{r}	revised
x	suppressed to meet the confidentiality requirements of the *Statistics Act*
^{E}	use with caution
F	too unreliable to be published
*	significantly different from reference category ($p < 0.05$)

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Table of contents

Abstract **5**

Executive summary **6**

1 Introduction **8**

2 Data, methods, and sample selection **10**

3 Descriptive results **14**

4 Regression results **32**

4.1 Workers with positive earnings in all years following job loss 32

4.2 Other high-attachment displaced workers 35

4.3 Layoffs in firm closures versus other layoffs 37

4.4 Discussion 40

5 Conclusion **43**

6 Appendix **44**

6.1 Sample sizes of the control groups 44

6.2 Factors explaining differences in layoff counts 45

References **46**

Abstract

This study examines long-term earnings losses of workers laid off during the early 1990s and the early 2000s using data from Statistics Canada's Longitudinal Worker File (LWF). In contrast to earlier studies, many of which focused on narrowly defined samples, this study compares earnings losses across all groups of displaced workers with stable labour market attachment prior to layoff. The study shows that focusing solely on high-seniority laid-off workers or workers laid off in firm closures leads to the exclusion of at least two-thirds of Canadian displaced workers with stable labour market attachment.

The study finds that substantial and su stained earnings losses are observed among many subsets of this population. The magnitude of long-term earnings losses varies with age, gender, employment trajectory prior to job loss, and labour market conditions. In a non -negligible number of cases, it is also sensitive to functional form. Importantly, substantial and sustained earnings losses are not limited to high-seniority workers or to periods with relatively high unemployment rates.

Keywords: worker displacement; job loss; layoffs; firm closures.

Executive summary

Prior to losing their jobs, workers may have displayed a stable attachment to the labour market as they: *(a)* stayed with the same employer for several years (high-seniority workers); *(b)* did not experience layoffs while making transitions across employers (low-seniority workers); or *(c)* avoided long-lasting spells of non-employment while experiencing some layoffs (previously laid-off workers). In all cases, some workers may have lost their jobs in firm closures while others may have been laid off because of declines in firm-level demand for goods and services that did not lead to firm closures.

Among workers who exhibit stable labour market attachment prior to job loss (henceforth, "high-attachment displaced workers"), which groups experience substantial and sustained earnings losses? Are persistent earnings losses observed only among high-seniority workers, or are they observed among other groups as well? Within seniority groupings, do earnings losses increase with age or remain fairly stable across age groups? Are sustained earnings losses observed only in periods of high unemployment, or are they observed also during periods of low unemployment?

The goal of this study is to answer these questions.

Using data from Statistics Canada's Longitudinal Worker File (LWF), the study shows that 2.3 million workers aged 21 to 55 were laid off at least once during the period from 1990 to 1993 and that 2 million workers in this age group were laid off at least once during the period from 2000 to 2003. Of these laid-off workers, close to 50% (or about 1 million workers) had stable labour market attachment prior to job loss, defined as six or more consecutive years of positive wages and salaries prior to being laid off.

In both periods, employees laid off in firm closures represented only a minority of high-attachment displaced workers. Of all high-attachment workers laid off between 1990 and 1993, only 14% were laid off in firm closures, while the corresponding proportion for the period from 2000 to 2003 was 11%.

Likewise, high-seniority workers (employees who remained with the same firm for at least six years prior to job loss) accounted for a relatively small share of high-attachment displaced workers. Of all high-attachment workers displaced between 1990 and 1993 who had positive earnings in all subsequent years, 18% had high seniority. Between 2000 and 2003, the corresponding proportion was 20%.

These numbers indicate that analyses focusing solely on earnings losses of high-seniority workers and of workers laid off in firm closures will exclude at least two-thirds of high-attachment workers displaced in any given period.

The study shows that substantial and sustained earnings losses are not limited to high-seniority workers or to periods with relatively high unemployment rates. For instance, five years after job loss, low-seniority men in all age groups experienced earnings losses of about 20% during the 1990s, and low-seniority men aged 36 to 55 experienced earnings losses that varied between 10% and 21% during the 2000s, a period associated with relatively low unemployment rates.

Substantial and persistent earnings losses are not limited to older workers either, at least during periods of slack labour markets. Whatever employment trajectory prior to job loss is considered, both young workers (aged 21 to 35) and their older counterparts experienced significant earnings losses during the 1990s. For the 2000s, the magnitude of the earnings losses incurred by young workers is sensitive to functional form; thus, a greater degree of uncertainty surrounds that issue.

The degree to which long-term earnings losses increase with age depends on individuals' employment trajectories prior to job loss. For instance, high-seniority men aged 46 to 55 displayed larger earnings losses than their counterparts aged 21 to 35 in both reference periods. However, this age-related difference in earnings losses is much smaller or is inexistent among low-seniority men and previously laid-off men.

The earnings losses experienced by previously laid-off workers were unambiguously smaller during the 2000s than during the 1990s; this was evident when either log earnings or earnings levels were considered. In contrast, the comparison of earnings losses experienced by low- and high-seniority workers in the 1990s and 2000s is sensitive to the functional form that is used. Earnings losses of these groups were smaller in the 2000s than the 1990s when measured in terms of log earnings, but were not much different when measured in terms of earnings levels. Hence, the data do not provide clear evidence of whether low- and high-seniority displaced workers experience smaller earnings losses during periods of tight, rather than slack, labour market conditions.

The finding that post-displacement long-term earnings losses are smaller during periods of low, rather than high, unemployment rates for workers who had been previously laid off is important. Since this group represents roughly half the population of high-attachment displaced workers, this finding implies that better labour market conditions mitigate long-term earnings losses for a significant segment of displaced workers.

However, the study also shows that both high- and low-seniority male workers aged 36 to 55 experienced long-term earnings losses of at least 10% even in the relatively tight labour market of the 2000s. Thus, while better labour market conditions are good news for many displaced workers, they do not eliminate the adverse earnings impact of job displacement for a significant number of others.

1 Introduction

Job displacement among workers who exhibit stable labour market attachment is an important research theme in labour economics and an issue highly relevant to public policy. Compared to employees with intermittent labour market participation, workers with stable labour market attachment are more likely to accumulate human capital through investments in firm-specific skills, industry-specific skills (Neal 1995), or occupation-specific skills (Poletaev and Robinson 2008). They may have found a good match between their skills and job requirements through job shopping (Topel and Ward 1992) or initially accepted wages below their productivity in order to obtain higher wages subsequently (Lazear 1981). These workers may be at risk of experiencing substantial earnings losses following job displacement because job loss may lead to the underutilization or erosion of their skills, the termination of a good employer–employee match, or the elimination of a wage premium received after accepting below-productivity wages.[1] Jacobson *et al.* (1993*a*, p. 138) noted that job displacement resulting from factors such as "technological progress, freer trade, or a healthier, more attractive environment" may benefit society, but also impose a heavy cost on the workers directly affected. This, they argued, is one rationale for programs that assist displaced workers with stable employment relationships.

Prior to job loss, workers may display stable labour market attachment through a variety of employment trajectories. They may stay with the same employer for several years, make voluntary transitions across employers while avoiding layoffs, or avoid long-lasting spells of non-employment after experiencing a layoff. For those individuals who experience a layoff, this may be precipitated by a firm closure or by other events not associated with a firm closure. Altogether, employees with stable labour market attachment—or "high-attachment employees" —who experience a layoff can be partitioned into several groups on the basis of their employment history and the circumstances of their layoff. This study assesses whether the earnings losses associated with layoffs differ systematically across groups.

Although economists' understanding of earnings losses resulting from layoff (or job displacement)[2] has improved substantially over the last two decades, variations in the earnings consequences experienced by high-attachment employees remain largely unexplored. One reason is that, while many recent studies have quantified the longer-term impacts of job displacement, they have done so for relatively narrow groups of workers. In their seminal study, Jacobson *et al.* (1993*b*) focused on high-seniority workers displaced in mass layoffs or firm closures in the early 1980s in the U.S. State of Pennsylvania. Couch and Placzek (2010) replicated the Jacobson *et al.* (1993*b*) research design for Connecticut. Hijzen *et al.* (2010) presented evidence based on U.K. data, restricting their attention to workers displaced in mass layoffs or firm closures, and Eliason and Storrie (2006) used Swedish data, focusing on workers displaced in establishment closures. The focus of these studies on mass layoffs and firm closures is due in large part to data constraints, since the administrative data used did not allow layoffs to be distinguished from quits and other separations. In the absence of this information, these researchers could examine the earnings outcomes of either all employee separations or job displacements as proxied by firm closures and mass layoffs. Given these studies' focus on displacement, the latter course was taken. However, as will be shown below, layoffs among high-seniority workers and layoffs due to firm closures represent only a small fraction of the layoffs experienced by high-attachment workers.

1. Along with (some of) their counterparts who do not display stable labour market attachment, some of these workers may also be subject to substantial earnings losses following displacement because they receive above-market wages as a result of a union, industry, or firm-size wage premium.
2. The terms *layoff* and *job displacement* are used interchangeably in this paper.

Other displacement studies have also used stringent sample selection criteria or have focused on specific age groups, again because of data constraints. For instance, Stevens (1997) could not identify the timing of job loss for workers displaced during the ten years prior to her reference period (1969 to 1986), and hence focused on laid-off workers who had not experienced any prior layoffs in that period. Kletzer and Fairlie (2003) and Chan and Stevens (2004) restricted their attention to young workers and older workers, respectively.[3]

Overall, it remains unclear whether conclusions regarding the earnings consequences of displacement resulting from mass layoffs or from firm closures can be generalized to all workers who are laid off. Furthermore, because different studies have documented long-term earnings losses by using different data sets, time intervals, and sample selection criteria, it is difficult to assess whether differences observed across groups of laid-off workers reflect true differences in outcomes or differences in the underlying data sets, in labour market conditions during the reference periods used, or in sample selection criteria. Unless such a distinction can be made, identifying which groups of high-attachment workers, if any, experience substantial and sustained earnings losses following layoff remains a significant challenge and a gap in the knowledge of the labour adjustment process.

Using a unique Canadian administrative data set that distinguishes between layoffs, quits, dismissals, and other employee separations, this study estimates the average long-term earnings losses incurred by workers with stable labour market attachment who experience a layoff. Again, the focus on these "high-attachment employees" is warranted because these workers may be at particular risk of experiencing substantial earnings losses in the wake of job displacement.

High-attachment displaced workers are defined as those with at least six consecutive years of positive wages and salaries prior to job loss. These workers are divided into three groups: *high-seniority workers*—those who experienced no layoffs and remained with the same employer for at least six years prior to lay-off; *low-seniority workers*—those who experienced no layoffs during the six years prior to layoff but changed employers at least once during that time; and *previously laid-off workers*—those who were laid off at least once during the previous six years. This approach provides a more comprehensive assessment of the earnings losses of high-attachment workers experiencing layoff than has been available to date.

Two broad questions are addressed: among workers with stable labour market attachment, do post-displacement earnings losses vary systematically between different groups?; and are post-displacement earnings losses associated with firm closures significantly different from earnings losses associated with other types of displacements?

Two reference periods are considered: 1990 to 1993, and 2000 to 2003. These are periods of relatively slack and relatively tight labour market conditions, respectively. The unemployment rates of men and women aged 25 to 54 averaged 9.5% and 9.0%, respectively, over the four-year period in the early 1990s, while they averaged 6.4% and 6.1%, respectively, over the four-year period in the early 2000s. Examining both periods allows earnings losses following layoff to be assessed in very different economic contexts and provides a useful indication of the range within which average earnings losses are likely to fall. While data are not yet available in order to assess the magnitude of the long-term earnings losses experienced by workers laid off during the Canadian economic recession that started in late 2008, the results of this study provide a probable range within which these losses are likely to fall.

3. As Couch and Placzek (2010, p. 574) pointed out, several other studies have examined the effect of displacement on earnings, but did not include a control group (Topel 1990; Carrington 1993; Neal 1995; Couch 1998; Jacobson *et al.* 2005) or quantified earnings losses no more than four years after job loss (Ruhm 1991; Farber 1993; Farber 1997; Chan and Stevens 1999).

The study contributes to the literature by providing a comprehensive assessment of average earnings losses across groups within a unified setting and by assessing the robustness of the patterns to alternative labour market conditions. The analysis also pays particular attention to functional-form issues by providing results from earnings models based on both level and logarithmic specifications. While some recent studies have used the former specification (Jacobson *et al.* 1993*b*; Couch and Placzek 2010; Hijzen *et al.* 2010) and others have used the latter (Stevens 1997; Kletzer and Fairlie 2003; Chan and Stevens 2004), none examines whether results vary between them. As it turns out, functional form does matter for conclusions about whether Canadian displaced workers experienced smaller earnings losses during the expansionary period of the early 2000s than they did during the recessionary years of the early 1990s.

The study documents several key patterns among displaced workers who had stable labour market attachment prior to job loss. First, for both reference periods and functional forms, high-seniority displaced workers aged 36 to 55 experienced substantial and sustained earnings losses: five years after displacement, their earnings losses amounted to at least 14% of their counterfactual earnings. Second, whatever periods and functional forms are considered, there is no evidence that low-seniority displaced men *systematically* have lower earnings losses than their high-seniority counterparts. Thus, substantial long-term earnings losses are not limited to high-seniority workers. The same pattern is observed for women during the early 1990s but not during the early 2000s. Third, for both functional forms, previously laid-off male and female displaced workers experienced long-term earnings losses of at least 15% during the early 1990s but much smaller losses during the early 2000s. Fourth, whether earnings losses of high-seniority and low-seniority displaced workers fell between these two periods depends on functional form. While models specified in levels generally suggest that earnings losses were similar in both periods, log earnings models point to substantially smaller losses in the early 2000s than during the early 1990s.

The paper is organized as follows. Section 2 presents the data, methods, and samples used in this study. Section 3 provides descriptive evidence on the number of high-attachment displaced workers and their earnings trajectories. Section 4 provides results from regression analyses. Concluding remarks follow, in Section 5.

2 Data, methods, and sample selection

This analysis is based on Statistics Canada's Longitudinal Worker File (LWF). The LWF is an administrative data set consisting of a 10% random sample of all Canadian workers. It is constructed from four separate data sources: the T4 and T1 files of the Canada Revenue Agency, the Record of Employment (ROE) files of Human Resources and Skills Development Canada, and the Longitudinal Employment Analysis Program (LEAP) file constructed by Statistics Canada. The LWF provides longitudinal information on individuals over the period from 1983 to 2008. This time frame is exploited in this study by tracking the earnings of workers displaced between 1990 and 1993 over the 1984-to-1998 period and the earnings of workers displaced between 2000 and 2003 over the 1994-to-2008 period.

The LWF has several features that make it well-suited to examining job displacement. First, unlike most administrative data sets used in this research area, the LWF distinguishes between various types of employee separations, allowing distinctions to be made between layoffs, dismissals, quits, and other separations.[4] This is done through the ROE, which specifies the

4. As mentioned above, the administrative data used by Jacobson *et al.* (1993*b*), Eliason and Storrie (2006), Couch and Placzek (2010), and Hijzen *et al.* (2010) do not allow this distinction.

reason for the work interruption or separation.[5] As a result, the LWF can directly identify *all* laid-off workers and allows the exclusion of workers separating for other reasons from the estimation sample.[6] Second, the LWF facilitates a distinction between temporary and permanent layoffs. A temporary layoff is defined as a situation where the employee returns to the same employer during the year of the layoff or in the following year. When such a return does not occur, the layoff is considered permanent. The focus of this study is permanent layoffs. Third, the LWF contains an enterprise identifier (from the LEAP file) that allows firm births and deaths to be identified. This information also allows layoffs resulting from firm closures to be identified.[7,8] Since firm closures affect all workers in a workplace, irrespective of their abilities or job performance, displacement of this sort mitigates the sample selection problem highlighted above (also see Gibbons and Katz 1991). It also makes it possible to test whether workers displaced in firm closures experience earnings losses different from those of other laid-off workers.[9]

5. The *Employment Insurance Act* and the related *Employment Insurance Regulations* require every employer to issue a ROE when an employee working in insurable employment has an interruption in earnings. The information contained on the ROE is used to determine whether a person qualifies for Employment Insurance (EI) benefits as well as the benefit rate and the duration of his/her claim in such cases. The ROE must be issued even when the employee does not intend to file a claim for EI benefits. More importantly, the ROE indicates the reason for the work interruption or separation. The ROE can thus be used to identify workers who are laid off, workers who quit, and workers who separate from their employers for other reasons.
6. Employers are requested to record a separation as a dismissal "when the employer initiates the separation from employment for any reason other than layoff or mandatory retirement (that is, the employee is leaving the workplace because he or she has been dismissed by the employer)" or "when the employment is terminated within a probationary period because the employee was not well suited for the position (that is, the employee was not able to satisfactorily perform the duties of the position)" (Service Canada 2011, p. 24). While employers who enter a false or misleading reason for a separation may be subject to penalty or prosecution, it is conceivable that some employers and employees might agree to re-label some true dismissals as layoffs. Yet, even in such cases, the LWF still contains more information for analyzing all layoffs than do administrative data sets that make no distinction between layoffs, dismissals, quits, and other types of separations (such as those used by Jacobson *et al.* [1993*b*], Eliason and Storrie [2006], Couch and Placzek [2010], and Hijzen *et al.* [2010]) or that do not distinguish between layoffs and dismissals (such as the Panel Study of Income Dynamics, used by Stevens [1997]).
7. The universe of LEAP includes businesses, incorporated or not, that issue a statement of remuneration paid to each of its employees for tax purposes (a T4 remittance slip). Businesses consisting solely of individuals or partnerships that do not draw a salary are excluded from LEAP.
8. Considerable methodological verification takes place to ensure that the longitudinal linkage of companies is reliable. In particular, "false" deaths are identified by using a "labour tracking" methodology aimed at distinguishing merger/acquisitions from real firm closures. See Baldwin *et al.* (1993) for more details. A firm closure is defined to occur in year *t* when a firm which had positive payroll in year *t* has no payroll in year *t+1*.
9. While the LWF contains longitudinal information on firm size, it is not perfectly suited for an analysis of mass layoffs. The reason is that the firm size variable is updated retrospectively when subsequent mergers and acquisitions occur. For instance, suppose that Firm A had 100 employees from 1990 to 2000 before being acquired by Firm B in 2001 and that Firm B had 1,500 employees from 1990 to 2001. Following the acquisition, the firm size variable for employees that initially belonged to firms A and B will be recoded to 1,600 employees from 1990 to 2001. As a result, the firm size variable is subject to measurement error. The share of firms involved in mergers and acquisitions as well as the number of workers they represent vary from year to year. For example, in 2007, 0.5% of active firms, representing around 13% of workers, were involved in mergers and acquisitions; in 2008, it was 0.4% of firms, representing 7.5% of workers. Because the number of mergers and acquisitions that took place between 1994 and 2008 is, by definition, higher than the number of mergers and acquisitions that took place between 2004 and 2008, the amount of measurement error will be greater for the 1990-to-1993 reference period than for the 2000-to-2003 reference period. To ensure that the data used are consistent across reference periods, no attempt is made to quantify layoffs due to mass layoffs in this study.

The LWF contains information on workers' age, sex, and seniority (in years) but does not contain information on their education, occupation prior to job loss, immigration status, or visible-minority status. Except for education, all of these latter variables are time-invariant; thus, their influence on workers' earnings intercept is controlled for in the fixed-effects regression analyses below. Furthermore, the large sample size of the LWF makes it possible to conduct separate analyses of earnings trajectories for groups of displaced workers defined jointly in terms of gender, age, and employment trajectory prior to job loss, three important dimensions along which heterogeneity in workers' age–earnings profiles may arise.[10]

In line with previous research (Jacobson *et al.* 1993*b*; Stevens 1997; Kletzer and Fairlie 2003; Chan and Stevens 2004), average earnings losses are estimated by using a fixed-effects specification:

$$y_{it} = \alpha_i + \beta_1 age_{it} + \beta_2 age_{it}^2 + \sum_{k=-3}^{8} D_{it}^k \delta_k + \tau_t + \varepsilon_{it} \qquad (1)$$

where: y_{it} denotes annual earnings (or their logarithmic value) of worker *i* from all jobs held in year *t*; D_{it}^k is a vector of dummy variables that equal *1* if worker *i* is laid off *k* years prior to year *t* and equal *0* otherwise; α_i is a vector of coefficients on worker-specific intercepts (fixed effects); τ_t is a vector of coefficients on year dummies; and ε_{it} is an error term.[11]

The impact of job displacement on earnings is evaluated for the first layoff observed during a four-year reference period. Two reference periods are considered—1990 to 1993, and 2000 to 2003—corresponding to a slack labour market and a tight labour market, respectively.[12] For each reference period, earnings of displaced workers and earnings of their control group are tracked over a 15-year time horizon: 1984 to 1998, and 1994 to 2008, respectively.

To assess the degree to which earnings losses are sensitive to functional form—i.e., to the dependent variable in equation (1) being specified in levels versus logs—displaced workers who display positive earnings in all years since the start of the reference period are considered first.[13] Other high-attachment laid-off workers, i.e., those who receive no earnings in some of the years following job loss, are examined subsequently, with equation (1) being then specified in levels.

10. While workers' industry of employment is available in the LWF, the industry classifications available vary across years. From 1983 to 1990, industry codes are based on the Standard Industrial Classification (SIC) of 1980. From 1991 to 2008, industry codes are based on the North American Industry Classification (NAICS) of 2002. Thus industry codes are not fully consistent across the two reference periods used in this study.
11. In line with Jacobson *et al.* (1993*b*), displacement is allowed to affect workers' earnings up to three years before it occurs. Since the first cohort of workers is laid off in 1990 (2000) and tracked until 1998 (2008), coefficients of post-displacement dummies can be estimated for up to eight years after job loss. Annual earnings received from all jobs are selected as the dependent variable in order to take account of the possibility that some workers may adjust to displacement by holding multiple jobs. Focusing on earnings received in the main job (job with highest earnings in a given year) might lead one to overestimate earnings losses. Initial investigations suggest that earnings losses are very similar for both metrics.
12. As mentioned above, the unemployment rate of men aged 25 to 54 averaged 9.5% in 1990-to-1993, compared to 6.4% in 2000-to-2003. The corresponding numbers for the periods 1990-to-1998 and 2000-to-2008 are 8.9% and 5.9%, respectively, for men and 8.5% and 5.6%, respectively, for women.
13. Keane (2010) recently reminded analysts of the importance of functional-form issues, among other issues.

For each reference period, equation (1) is estimated separately for three types of high-attachment workers, depending on their employment trajectories leading up to the reference period. High-attachment workers are defined as individuals with positive wages and salaries for at least six consecutive years leading up to the reference period, with three sub-groups identified:

i) high-seniority workers: high-attachment individuals who experienced no layoffs and remained with the same (main) employer for at least six years prior to the reference period;
ii) low-seniority workers: high-attachment individuals who experienced no layoffs during the six years prior to the reference period, but changed employers at least once in that time; and
iii) previously laid-off workers: high-attachment individuals who were laid off at least once during the six years prior to the reference period.

For a given employment trajectory, men and women (as well as younger and older workers) may exhibit different levels and rates of earnings growth. To account for these differences, employment-trajectory-specific versions of equation (1) are estimated separately for men and women in three age groups, 21 to 35, 36 to 45, and 46 to 55, in the year preceding the beginning of the reference period.[14,15]

Thus, equation (1) is estimated separately for 18 subsets of high-attachment workers jointly defined by gender, three age categories, and three employment trajectories (or groups) prior to job loss, thereby taking account of the heterogeneity in earnings growth observed across these three dimensions.

To estimate earnings losses following displacement, each of the 18 subsets of high-attachment laid-off workers is compared to a control group with similar gender, age, and employment trajectory. For instance, the control group for previously laid-off men aged 46 to 55 who were laid off between 1990 and 1993 will consist of previously laid-off men aged 46 to 55 who were not laid off between 1990 and 1993.[16] Two control groups are considered for each of the 18 subsets of high-attachment workers. The first consists of individuals who experienced no layoffs between 1990 and 1993 (2000 and 2003), while the second consists of individuals who experienced no layoffs between 1990 and 1993 (2000 and 2003) and who worked for the same employer during those four years.

Both control groups are restricted to workers who had positive earnings in all nine years since the start of the reference period.[17] These control groups are chosen in order to vary the degree to which individuals experienced "a smooth ride" in the labour market over the study period and therefore the degree to which they represent a selective subset of all workers. In this sense, control group 2 is a more selective subsample than control group 1, and post-displacement earnings losses are expected to be larger when one uses control group 2 than when one uses control group 1.

14. For the 1990-to-1993 (2000-to-2003) reference period, age is measured as of 1989 (1999).
15. Workers over 55 years of age are not considered since differences between their pre- and post-displacement earnings might partly reflect voluntary reductions in work hours associated with their work-to-retirement transition, an issue that is beyond the scope of this study.
16. All samples are restricted to workers who are employed in firms with at least two employees and in jobs that have insurable earnings.
17. As Table 13 shows, the sample sizes for the various control groups are fairly substantial.

3 Descriptive results

As shown in Table 1, 2.291 million workers aged 21 to 55 were laid off at least once during the 1990-to-1993 period and 2.029 million such workers were laid off during the 2000-to-2003 period.[18] Of these, close to one-half (or about 1 million workers) in each period had stable labour market attachment prior to job loss, defined as at least six consecutive years of positive wages and salaries prior to being laid off. This was the case for just over 50% of men who experienced layoff and for around 40% of women who did so.

Of the 1.053 million laid-off workers who displayed stable labour market attachment during the early 1990s, 54% (573,000) had positive earnings in all years following job loss (i.e., between 1990 and 1998). The corresponding proportion was 67% during the early 2000s, as a greater proportion of men and women registered positive earnings between 2000 and 2008.

Together, the figures in Table 1 indicate that, of all men laid off during the 1990-to-1993 and 2000-to-2003 reference periods, 28% and 35%, respectively, had stable labour market attachment prior to job loss *and* positive earnings in each of the nine years between 1990 and 1998 and between 2000 and 2008.[19] A further 22% and 16% had stable labour market attachment prior to job loss but did not have positive earnings in each year between 1990 and 1998 and between 2000 and 2008.

18. See Subsection 6.2 of the Appendix for a comparison of these numbers with those published in Chan *et al.* (2011).
19. This can be seen by dividing 410,000 by 1.443 million during the early 1990s and by dividing 427,000 by 1.234 million during the early 2000s.

Table 1

Number of workers laid-off in 1990 to 1993 and 2000 to 2003, by gender, labour market attachment prior to job loss, and earnings status following job loss

	1990 to 1993		2000 to 2003	
	thousands	**percent**	**thousands**	**percent**
Panel 1 – Both sexes				
Laid-off workers	2,291	100	2,029	100
No stable labour market attachment prior to job loss	1,238	54	1,052	52
Stable labour market attachment prior to job loss	1,053	46	977	48
Positive earnings in all years following job loss	573	25	650	32
Other	480	21	327	16
Panel 2 – Men				
Laid-off workers	1,443	100	1,234	100
No stable labour market attachment prior to job loss	712	49	604	49
Stable labour market attachment prior to job loss	731	51	630	51
Positive earnings in all years following job loss	410	28	427	35
Other	321	22	203	16
Panel 3 – Women				
Laid-off workers	849	100	795	100
No stable labour market attachment prior to job loss	527	62	447	56
Stable labour market attachment prior to job loss	322	38	348	44
Positive earnings in all years following job loss	164	19	223	28
Other	158	19	125	16

Notes: The numbers refer to workers aged 21 to 55 in the year preceding the beginning of the reference period. Workers with stable labour market attachment prior to job loss are defined as having positive wages and salaries in all six years preceding job loss.
Source: Statistics Canada, Longitudinal Worker File.

Among women laid off during the two reference periods, 19% and 28%, respectively, had stable labour market attachment prior to job loss *and* positive earnings in each subsequent year, while a further 19% and 16% had stable labour market attachment prior to job loss but did not have positive earnings in each of the subsequent nine years.

It is noteworthy that, although the unemployment rate among individuals aged 25 to 54 was almost 3-percentage-points higher from 1990 to 1993 than from 2000 to 2003, the numbers of layoffs registered during the two periods were not as different as one might expect (at 2.3 million workers and 2.0 million workers, respectively). This testifies to the extent to which ongoing layoffs are part of the labour adjustment process over the business cycle.

The main contribution of this study is to provide estimates of earnings losses for all groups of high-attachment workers who were displaced rather than for a narrow subset of them. The importance of doing so is highlighted in Table 2, which shows the percentage distribution of high-attachment displaced workers by employment trajectory and type of layoff.

Table 2

Percentage of workers with stable labour market attachment laid-off in firm closures and other layoffs, by employment trajectory prior to job loss

	1990 to 1993				2000 to 2003			
	High-seniority workers (column 1)	Low-seniority workers (column 2)	Previously laid-off workers (column 3)	Total (column 4)	High-seniority workers (column 5)	Low-seniority workers (column 6)	Previously laid-off workers (column 7)	Total (column 8)
	percent							
Panel A - All workers with stable labour market attachment								
Firm closures	2.8	4.5	7.1	14.4	2.6	3.3	5.0	10.9
Other layoffs	15.9	27.1	42.5	85.6	19.0	26.7	43.4	89.1
All layoffs	18.8	31.6	49.7	100.0	21.6	30.0	48.4	100.0
Panel A1 - Workers with positive earnings in all years following job loss								
Firm closures	3.0	4.5	7.5	15.0	2.5	3.3	5.1	10.9
Other layoffs	14.9	27.1	43.0	85.0	17.8	26.5	44.8	89.1
All layoffs	17.9	31.6	50.5	100.0	20.3	29.8	49.9	100.0
Panel A2 - Workers without earnings in some years following job loss								
Firm closures	2.7	4.4	6.7	13.8	2.7	3.4	4.8	10.9
Other layoffs	17.1	27.2	41.9	86.2	21.3	27.1	40.6	89.1
All layoffs	19.8	31.6	48.7	100.0	24.1	30.5	45.4	100.0

Note: The sample consists of workers aged 21 to 55 in the year preceding the beginning of the reference period who had positive wages and salaries for at least six consecutive years prior to job loss (workers with stable labour market attachment prior to job loss) as well as for all years of the 1990-to-1998 (or 2000-to-2008) period.
Source: Statistics Canada, Longitudinal Worker File.

As shown in columns 1 and 5 of panel A, about one-fifth of high-attachment employees laid off in the early 1990s and the early 2000s were "high-seniority workers"—those who had worked for the same employer during the prior six years and had not experienced any layoffs during that time. As shown in columns 2 and 6 of panel A, almost one-third of high-attachment laid-off employees were "low-seniority workers"—those who had ch anged employers at least once during the prior six years but had not experienced any layoffs during that time. In addition, as shown in columns 3 and 7 of panel A, slightly less than one-half of high-attachment laid-off employees were "previously laid-off workers"—those who had experienced at least one layoff in the six years prior to the reference period. This last finding is consistent with Stevens (1997). The distribution of high-attachment laid-off employees across the three groups is much the same when further disaggregated in terms of positive earnings in the years following displacement (panels A1 and A2).

It is also evident from Table 2 that firm closures account for a fairly small proportion of layoffs among high-attachment employees—14% in 1990-to-1993 and 11% in 2000-to-2003. More broadly, all layoffs due to firm closures combined with layoffs experienced by high-seniority workers accounted for less than one-third of all layoffs experienced by high-attachment employees between 1990 and 1993 (14.4%+15.9%) and between 2000 and 2003 (10.9%+19.0%). Consequently, an analysis limited to high-seniority laid-off workers and workers

laid off in firm closures would exclude at least two-thirds of high-attachment laid-off workers, this being the case in periods characterized by both lower and higher unemployment rates. This conclusion holds when the sample of laid-off workers is further disaggregated in terms of positive earnings in the years following displacement (panels A1 and A2).

The top portions of Tables 3 and 4 show the average annual earnings of high-attachment laid-off workers over the period from six to three years prior to layoff (denoted as *t-6* and *t-3*).[20] Table 3 includes individuals who had positive earnings in all years following displacement, while Table 4 includes individuals who had no earnings in some years following displacement.[21] For both groups, average annual earnings were highest among high-seniority workers and lowest among previously laid-off workers.[22] Between 1990 and 1993, for example, the average annual earnings of high-seniority men aged 36 to 45 who had positive earnings in all years following job loss were $54,700 (in 2009 dollars), compared with $38,400 among previously laid-off workers (Table 3). The earnings of low-seniority workers fell between these two figures, with average annual earnings of $49,700.

The bottom portions of Tables 3 and 4 show the average change in log annual earnings between *t-6* and *t-3*. While high-seniority workers had higher average annual earnings than the other groups, they experienced lower earnings growth over this period. For example, Table 3 shows that, among men aged 36 to 45, average annual earnings of high-seniority workers increased by 6 log points (6%) over this period, compared with increases of 8 log points and 17 log points (8% and 19 %) among low-seniority and previously laid-off workers, respectively. Similar patterns are observed in Table 4.[23]

20. Since previous research suggests that earnings begin to decline prior to job loss, years *t-3* and *t-6* are selected in order to assess differences in earnings levels and in earnings growth across groups before imminent job loss starts impacting workers' earnings. Since there is evidence that earnings start to fall three years prior to job loss (e.g., Jacobson *et al.* [1993*b*]), we would ideally like to use year *t-4* (rather than year *t-3*) to compute earnings growth. Because some of the workers in our samples have no earnings prior to year *t-6*, doing so would lead us to consider a fairly short time interval ranging from *t-6* to *t-4*. Our choice of the years *t-6* and *t-3* reflects a trade-off between the length of the time interval considered and the degree to which earnings in these years are potentially affected by displacement.
21. The LWF does not contain information on international emigration and contains only minimal information on retirement and death. Consequently, it is not clear how zero earnings following layoff ought to be interpreted. Considering individuals in these two groups separately allows this issue to be isolated.
22. Throughout the paper, annual earnings are measured in 2009 dollars by using the consumer price index ("All items") as a deflator.
23. The percentage increases equal the antilog of the increase in log points minus 1.

Table 3

Average earnings and earnings growth prior to job loss, laid-off workers with stable labour market attachment prior to job loss and positive earnings in all years following job loss

	1990 to 1993			2000 to 2003		
	High-seniority workers (column 1)	Low-seniority workers (column 2)	Previously laid-off workers (column 3)	High-seniority workers (column 4)	Low-seniority workers (column 5)	Previously laid-off workers (column 6)
			2009 dollars			
Average earnings between year *t-6* and year *t-3*						
Men aged						
21 to 55	49,100	35,900	29,700	47,900	34,100	28,900
21 to 35	42,500	29,800	25,000	38,600	26,000	22,900
36 to 45	54,700	49,700	38,400	50,800	46,400	34,500
46 to 55	55,900	51,600	41,600	56,100	50,600	38,300
Women aged						
21 to 55	29,700	22,800	16,600	31,800	22,800	17,600
21 to 35	28,100	20,900	15,700	27,700	18,900	15,500
36 to 45	32,200	26,900	18,600	33,100	27,800	19,800
46 to 55	28,900	27,400	18,500	34,100	29,200	20,300
			log points			
Earnings growth between year *t-6* and year *t-3*						
Men aged						
21 to 55	0.09	0.35	0.38	0.08	0.35	0.31
21 to 35	0.14	0.47	0.49	0.17	0.50	0.46
36 to 45	0.06	0.08	0.17	0.05	0.14	0.17
46 to 55	0.02	0.05	0.12	0.02	0.00	0.10
Women aged						
21 to 55	0.10	0.33	0.34	0.10	0.30	0.29
21 to 35	0.10	0.41	0.42	0.15	0.42	0.42
36 to 45	0.10	0.17	0.20	0.09	0.18	0.18
46 to 55	0.06	0.10	0.16	0.05	0.05	0.08

Notes: The sample consists of workers aged 21 to 55 in the year preceding the beginning of the reference period who had positive wages and salaries for at least six consecutive years prior to job loss as well as for all years of the 1990-to-1998 (or 2000-to-2008) period. "Year *t-3*" (*t* minus 3) and "year *t-6*" (*t* minus 6) denote the third and sixth year, respectively, prior to the first layoff observed during the reference period.

Source: Statistics Canada, Longitudinal Worker File.

Table 4

Average earnings and earnings growth prior to job loss, laid-off workers with stable labour market attachment prior to job loss and no earnings in some years following job loss

	1990 to 1993			2000 to 2003		
	High-seniority workers (column 1)	Low-seniority workers (column 2)	Previously laid-off workers (column 3)	High-seniority workers (column 4)	Low-seniority workers (column 5)	Previously laid-off workers (column 6)
			2009 dollars			
Average earnings between year *t-6* and year *t-3*						
Men aged						
21 to 55	49,600	36,300	26,300	52,900	36,600	27,100
21 to 35	41,700	28,700	21,700	38,700	25,900	21,400
36 to 45	53,700	47,400	31,700	53,500	47,400	30,600
46 to 55	54,400	50,700	36,400	60,800	52,800	36,000
Women aged						
21 to 55	27,700	21,700	15,200	33,200	23,300	16,900
21 to 35	27,000	20,200	14,600	27,800	19,100	15,200
36 to 45	29,100	24,900	16,600	34,700	28,900	19,000
46 to 55	27,300	23,900	15,700	35,000	28,500	18,600
			log points			
Earnings growth between year *t-6* and year *t-3*						
Men aged						
21 to 55	0.05	0.26	0.34	0.05	0.27	0.24
21 to 35	0.14	0.40	0.44	0.15	0.45	0.39
36 to 45	0.02	0.07	0.20	0.07	0.10	0.12
46 to 55	-0.01	0.00	0.17	-0.02	0.00	0.05
Women aged						
21 to 55	0.05	0.25	0.29	0.06	0.27	0.22
21 to 35	0.08	0.34	0.38	0.12	0.41	0.36
36 to 45	0.05	0.11	0.17	0.07	0.13	0.11
46 to 55	0.04	0.04	0.12	0.01	0.01	0.04

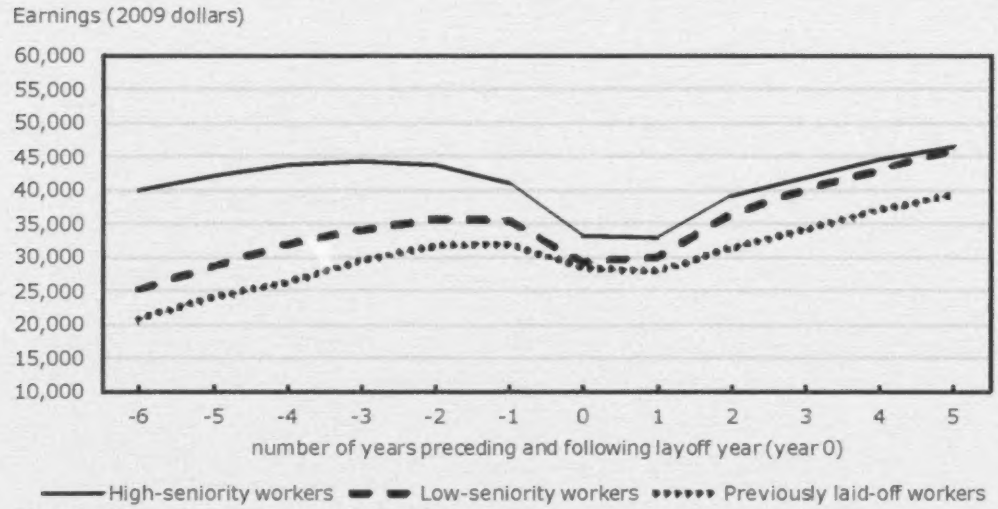
Notes: The sample consists of workers aged 21 to 55 in the year preceding the beginning of the reference period who had positive wages and salaries for at least six consecutive years prior to job loss, but not in all years of the 1990-to-1998 (or 2000-to-2008) period. "Year *t-3*" (*t* minus 3) and "year *t-6*" (*t* minus 6) denote the third and sixth year, respectively, prior to the first layoff observed during the reference period.

Source: Statistics Canada, Longitudinal Worker File.

Pre-layoff earnings *levels* and *growth rates* are important for assessing the consequences of job displacement. When measured in terms of *earnings declines*—defined as the difference in average earnings received in the years before and af ter layoff—high-seniority workers experienced the largest average losses (Charts 1 to 12). This is consistent with Jacobson *et al.* (2005), who also found larger earnings declines among high-seniority workers than among their lower-seniority counterparts.

Chart 1

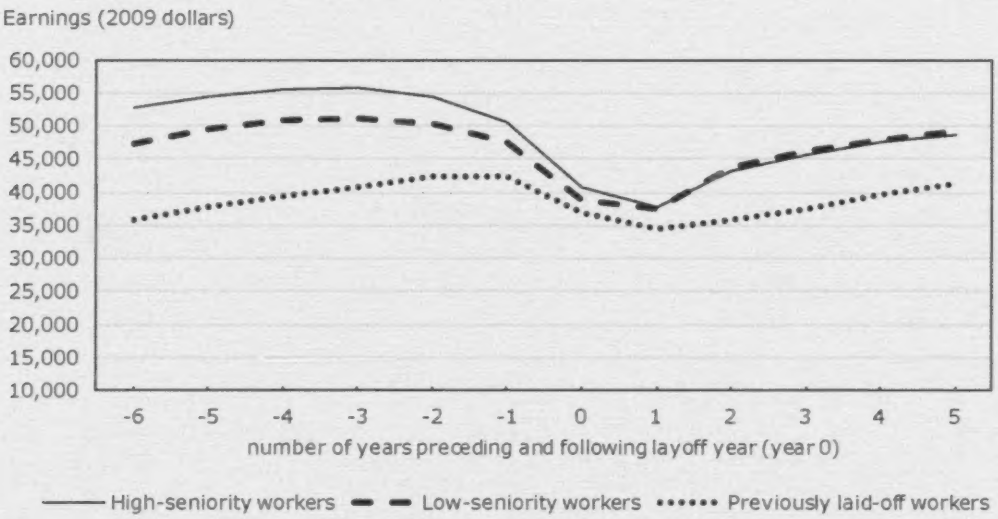
Earnings declines surrounding layoffs in 1990 to 1993 — Men aged 21 to 35 in 1989



Note: The sample consists of workers with stable labour market attachment prior to job loss and positive earnings in all years following job loss.
Source: Statistics Canada, Longitudinal Worker File.

Chart 2

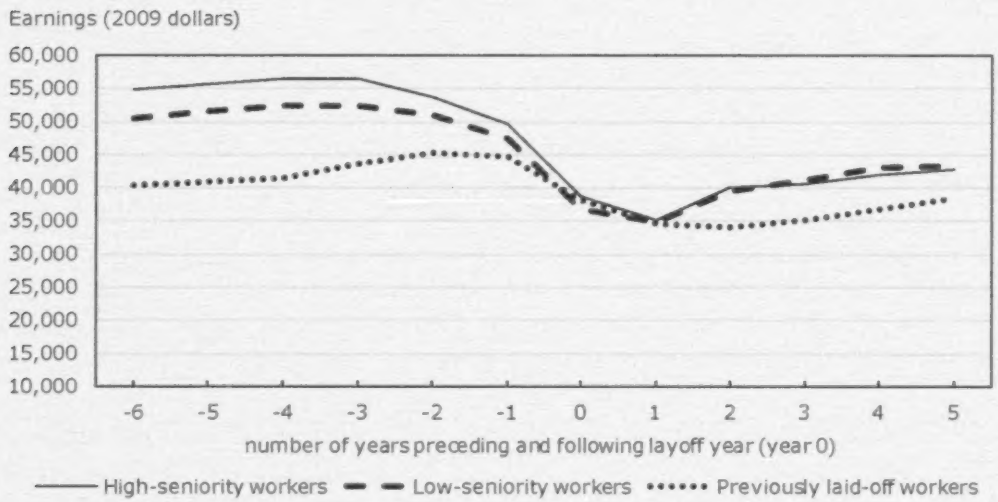
Earnings declines surrounding layoffs in 1990 to 1993 — Men aged 36 to 45 in 1989



Note: The sample consists of workers with stable labour market attachment prior to job loss and positive earnings in all years following job loss.
Source: Statistics Canada, Longitudinal Worker File.

Chart 3

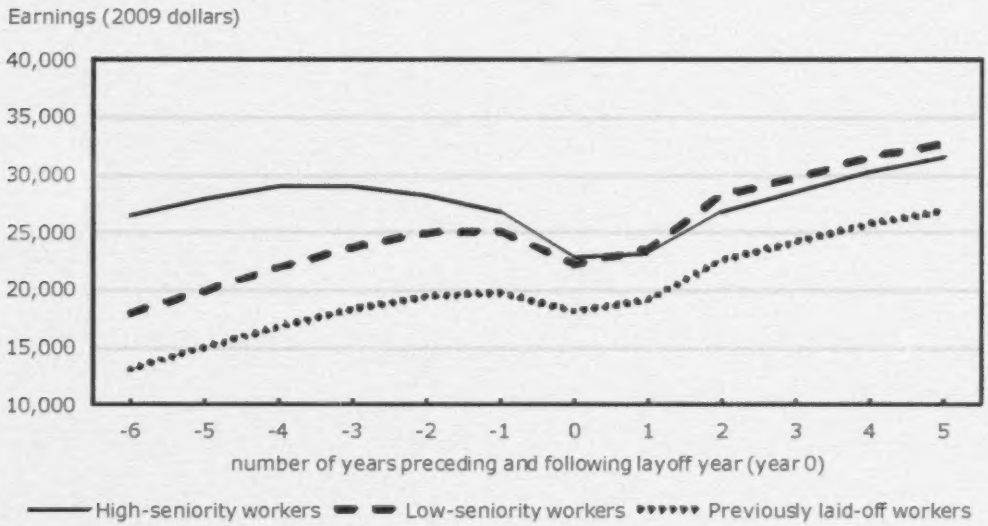
Earnings declines surrounding layoffs in 1990 to 1993 — Men aged 46 to 55 in 1989



Note: The sample consists of workers with stable labour market attachment prior to job loss and positive earnings in all years following job loss.
Source: Statistics Canada, Longitudinal Worker File.

Chart 4

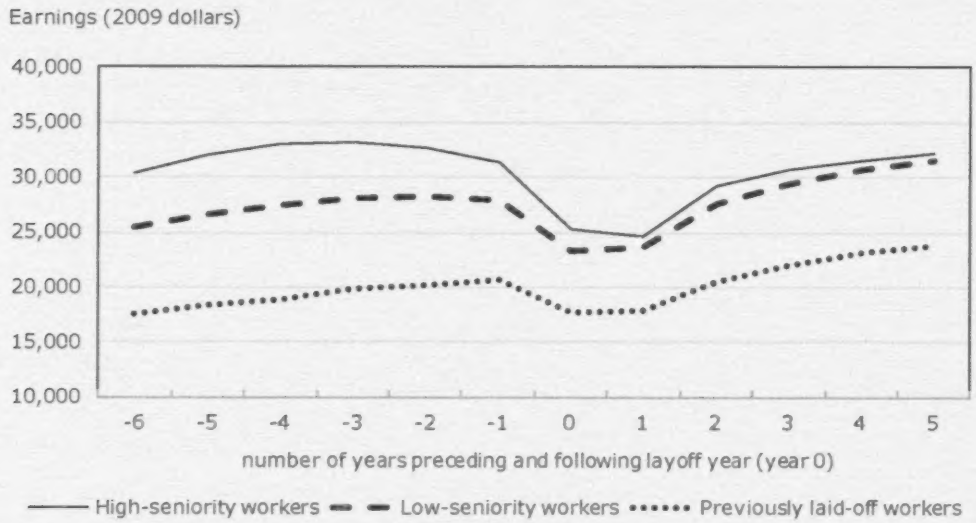
Earnings declines surrounding layoffs in 1990 to 1993 — Women aged 21 to 35 in 1989



Note: The sample consists of workers with stable labour market attachment prior to job loss and positive earnings in all years following job loss.
Source: Statistics Canada, Longitudinal Worker File.

Chart 5

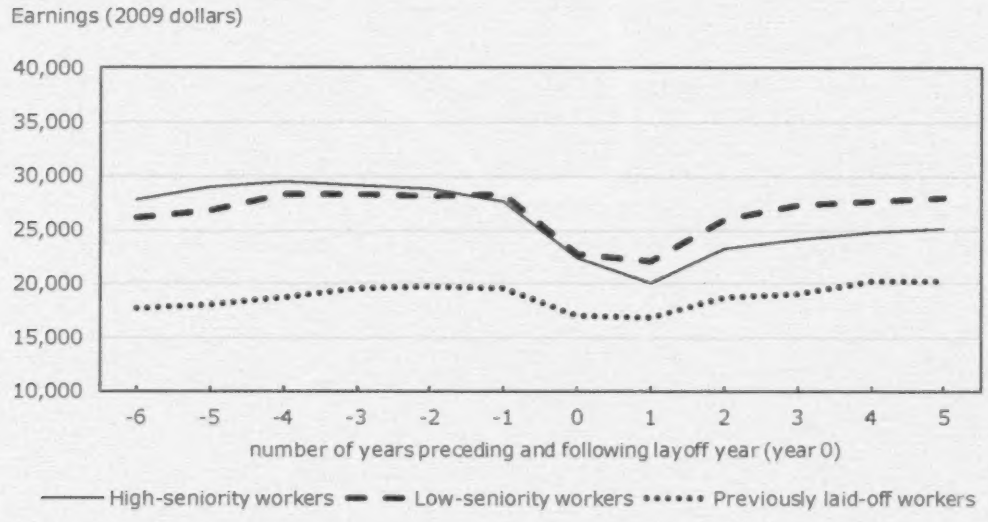
Earnings declines surrounding layoffs in 1990 to 1993 — Women aged 36 to 45 in 1989



Note: The sample consists of workers with stable labour market attachment prior to job loss and positive earnings in all years following job loss.
Source: Statistics Canada, Longitudinal Worker File.

Chart 6

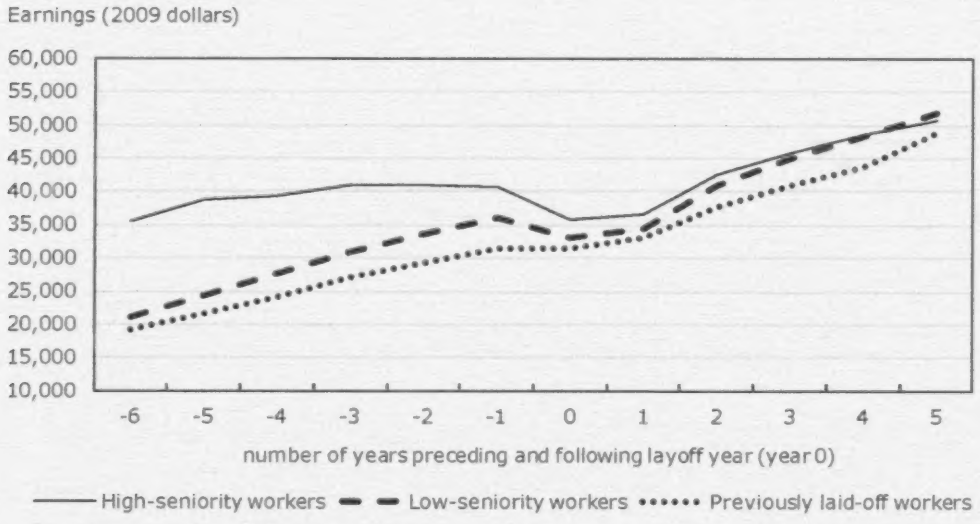
Earnings declines surrounding layoffs in 1990 to 1993 — Women aged 46 to 55 in 1989



Note: The sample consists of workers with stable labour market attachment prior to job loss and positive earnings in all years following job loss.
Source: Statistics Canada, Longitudinal Worker File.

Chart 7

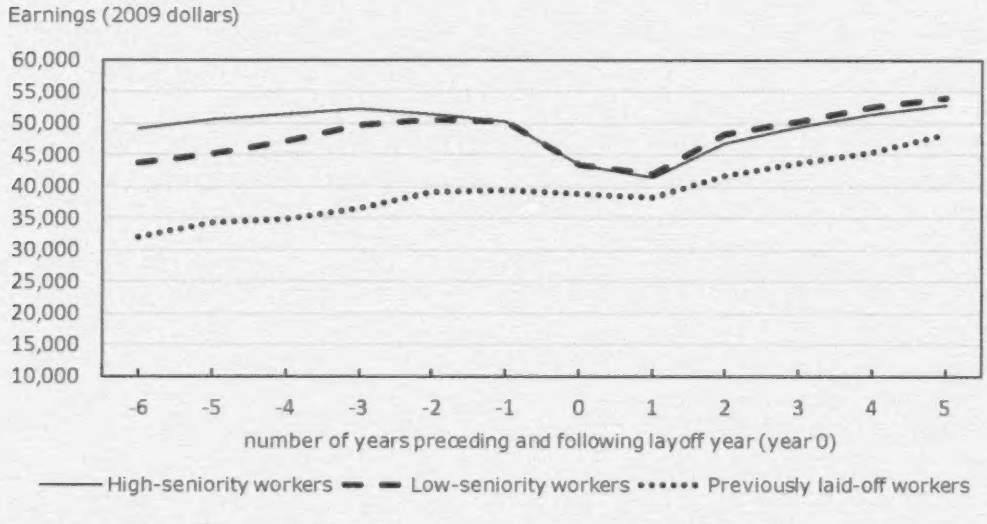
Earnings declines surrounding layoffs in 2000 to 2003 — Men aged 21 to 35 in 1999



Note: The sample consists of workers with stable labour market attachment prior to job loss and positive earnings in all years following job loss.
Source: Statistics Canada, Longitudinal Worker File.

Chart 8

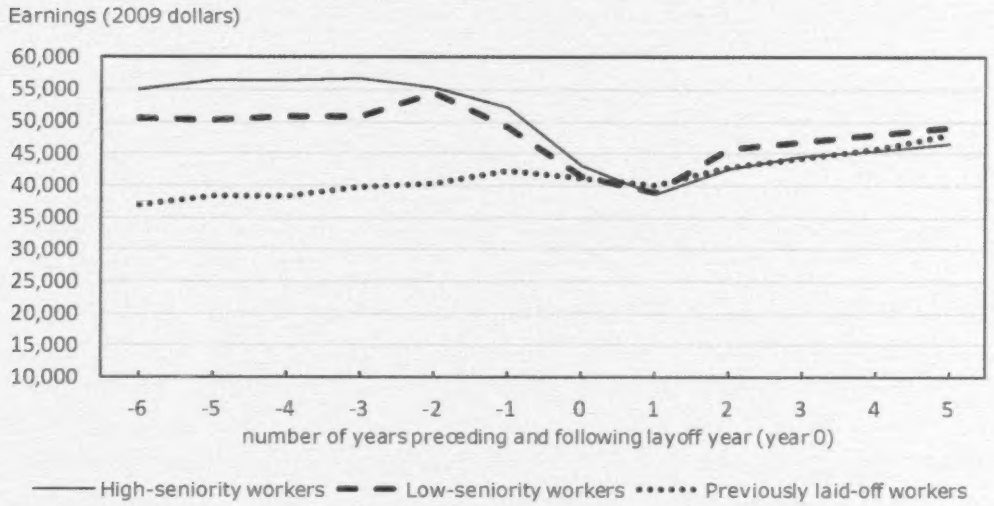
Earnings declines surrounding layoffs in 2000 to 2003 — Men aged 36 to 45 in 1999



Note: The sample consists of workers with stable labour market attachment prior to job loss and positive earnings in all years following job loss.
Source: Statistics Canada, Longitudinal Worker File.

Chart 9

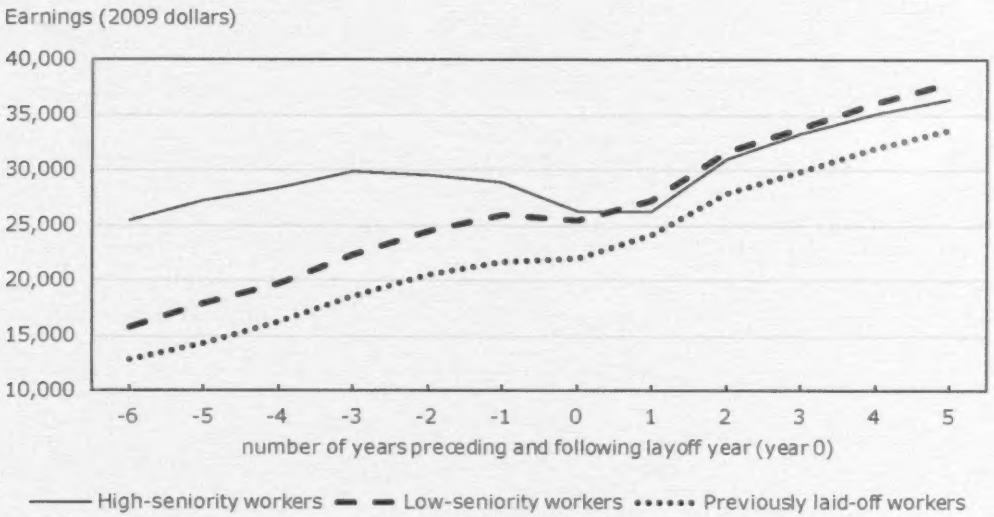
Earnings declines surrounding layoffs in 2000 to 2003 — Men aged 46 to 55 in 1999



Note: The sample consists of workers with stable labour market attachment prior to job loss and positive earnings in all years following job loss.
Source: Statistics Canada, Longitudinal Worker File.

Chart 10

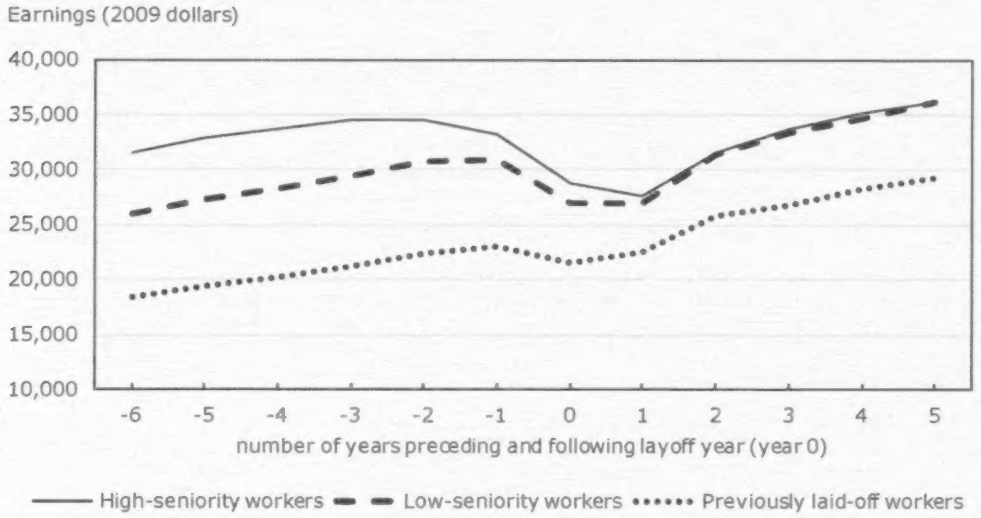
Earnings declines surrounding layoffs in 2000 to 2003 — Women aged 21 to 35 in 1999



Note: The sample consists of workers with stable labour market attachment prior to job loss and positive earnings in all years following job loss.
Source: Statistics Canada, Longitudinal Worker File.

Chart 11

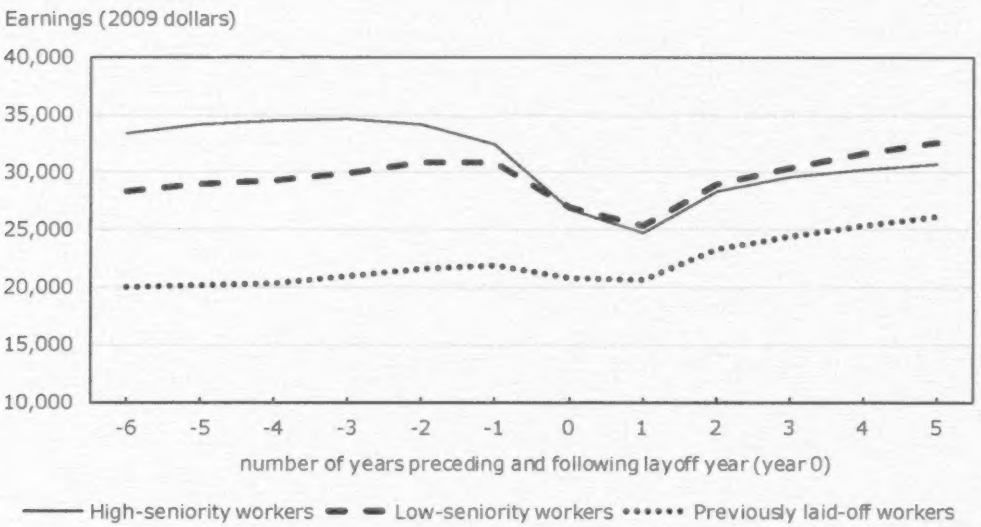
Earnings declines surrounding layoffs in 2000 to 2003 — Women aged 36 to 45 in 1999



Note: The sample consists of workers with stable labour market attachment prior to job loss and positive earnings in all years following job loss.
Source: Statistics Canada, Longitudinal Worker File.

Chart 12

Earnings declines surrounding layoffs in 2000 to 2003 — Women aged 46 to 55 in 1999



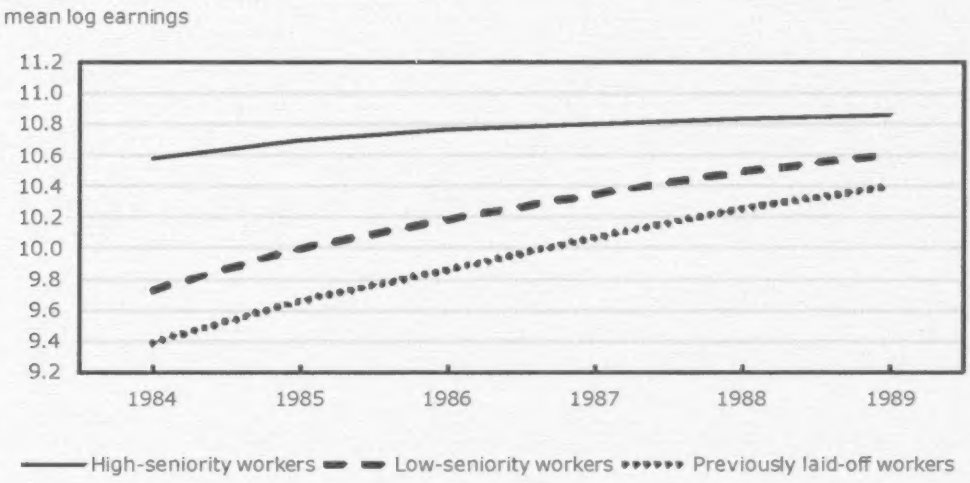
Note: The sample consists of workers with stable labour market attachment prior to job loss and positive earnings in all years following job loss.
Source: Statistics Canada, Longitudinal Worker File.

However, while high-seniority workers experience larger *earnings declines* than the other two groups, their earnings profiles prior to layoff tend to be flatter. This is important since it suggests that high-seniority workers might not incur larger *earnings losses* (foregone earnings)—defined as the difference between earnings received after layoff and a reasonable approximation of a counterfactual earnings profile they would have followed had they not been laid off. Charts 13 to 24, which show the observed earnings profiles of the first control group used in the paper (i.e., workers who were not laid off during the reference periods), provide some support for this hypothesis. Over the six years leading up to the reference period, the control group for high-seniority workers had higher earnings than the other groups but also flatter age–earnings profiles. The difference in the slopes across the three groups is especially pronounced among the youngest age group, particularly among young men.

In sum, Tables 3 and 4 and Charts 1 to 24 document substantial heterogeneity in the slopes of workers' age–earnings profiles across age groups and employment trajectories. As such, they suggest that equation (1) is best estimated separately by age and type of employment trajectory for men and women.

Chart 13

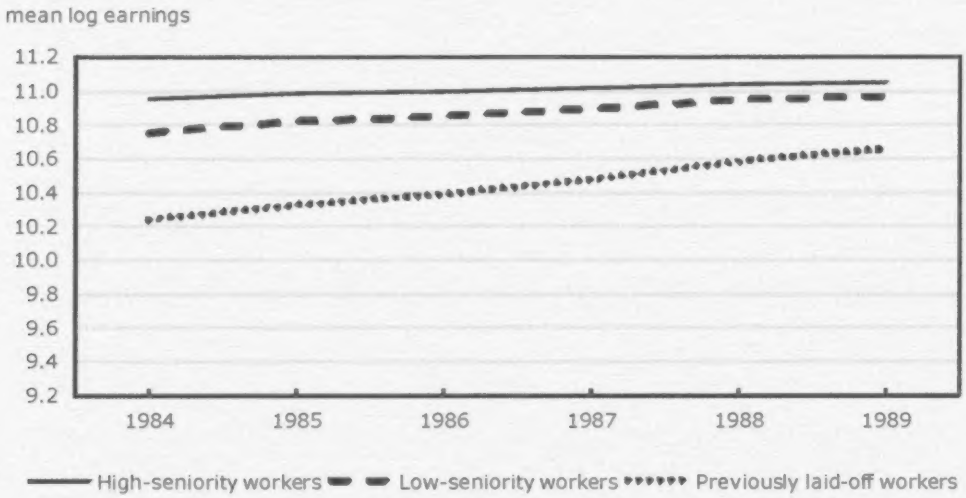
Mean log earnings of control group 1, 1984 to 1989 — Men aged 21 to 35 in 1989



Source: Statistics Canada, Longitudinal Worker File.

Chart 14

Mean log earnings of control group 1, 1984 to 1989 — Men aged 36 to 45 in 1989



Source: Statistics Canada, Longitudinal Worker File.

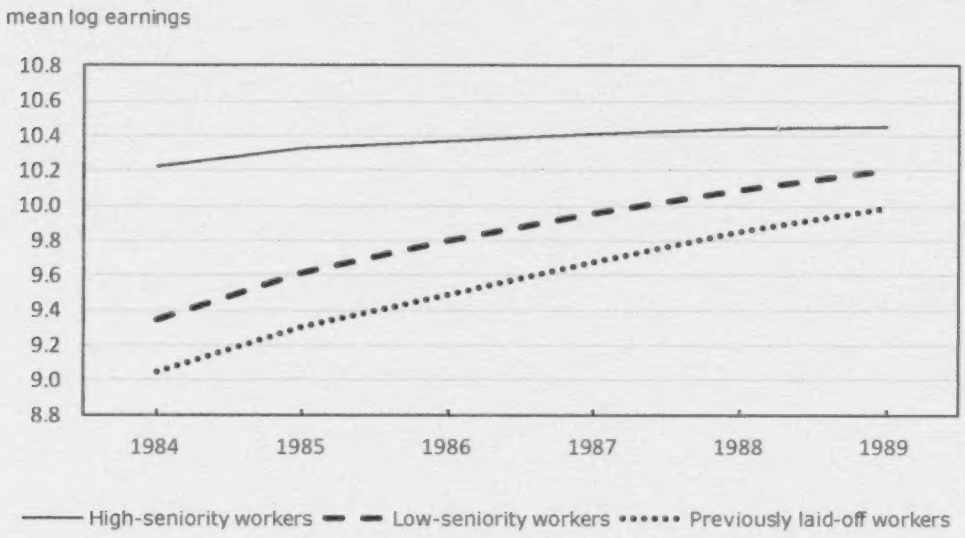
Chart 15

Mean log earnings of control group 1, 1984 to 1989 — Men aged 46 to 55 in 1989

Source: Statistics Canada, Longitudinal Worker File.

Chart 16

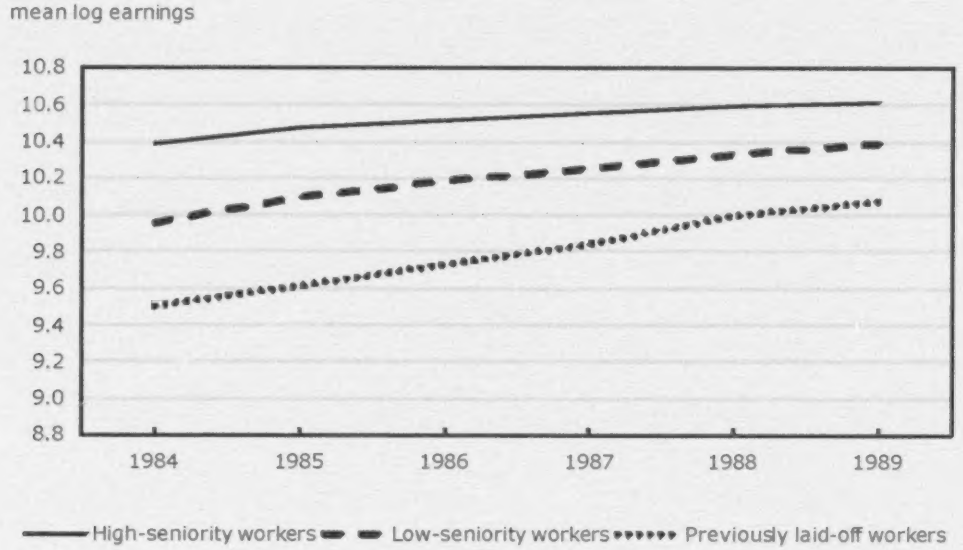
Mean log earnings of control group 1, 1984 to 1989 — Women aged 21 to 35 in 1989



Source: Statistics Canada, Longitudinal Worker File.

Chart 17

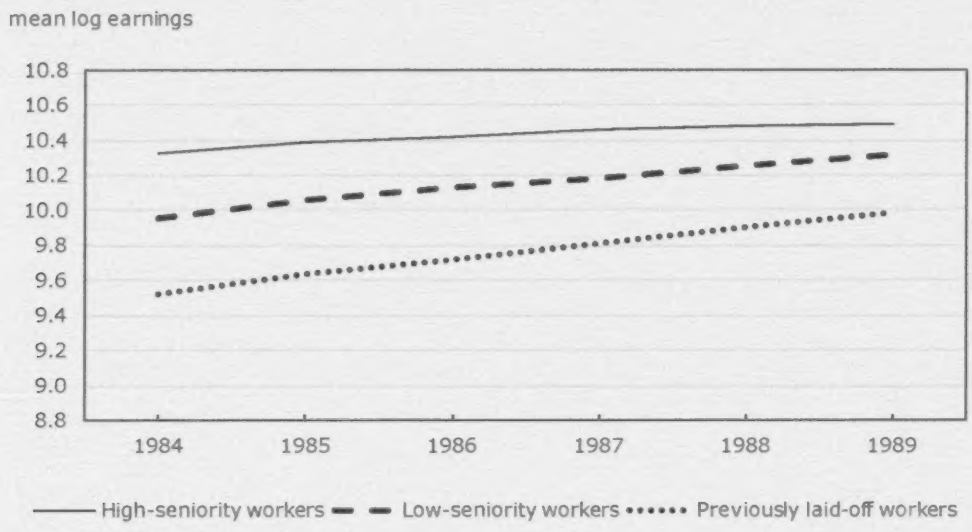
Mean log earnings of control group 1, 1984 to 1989 — Women aged 36 to 45 in 1989



Source: Statistics Canada, Longitudinal Worker File.

Chart 18

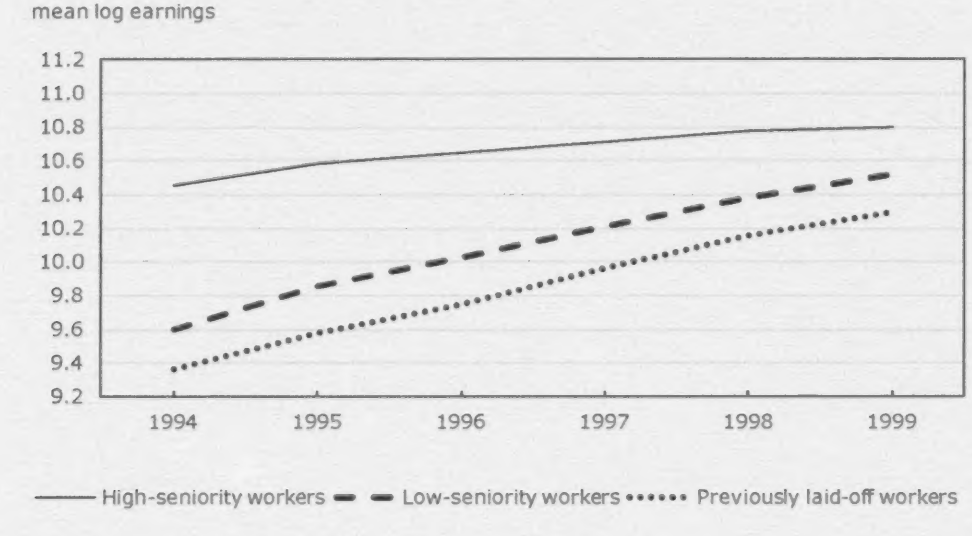
Mean log earnings of control group 1, 1984 to 1989 — Women aged 46 to 55 in 1989



Source: Statistics Canada, Longitudinal Worker File.

Chart 19

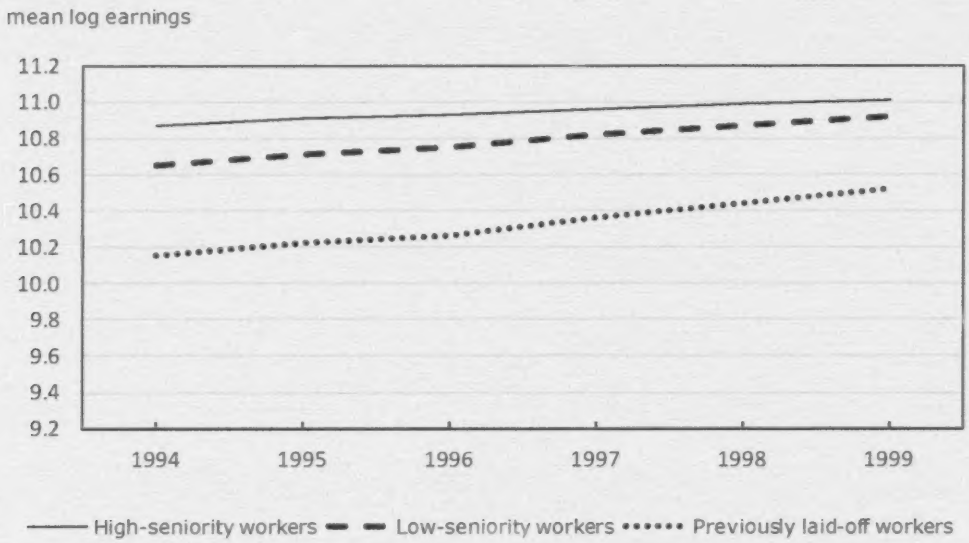
Mean log earnings of control group 1, 1994 to 1999 — Men aged 21 to 35 in 1999



Source: Statistics Canada, Longitudinal Worker File.

Chart 20

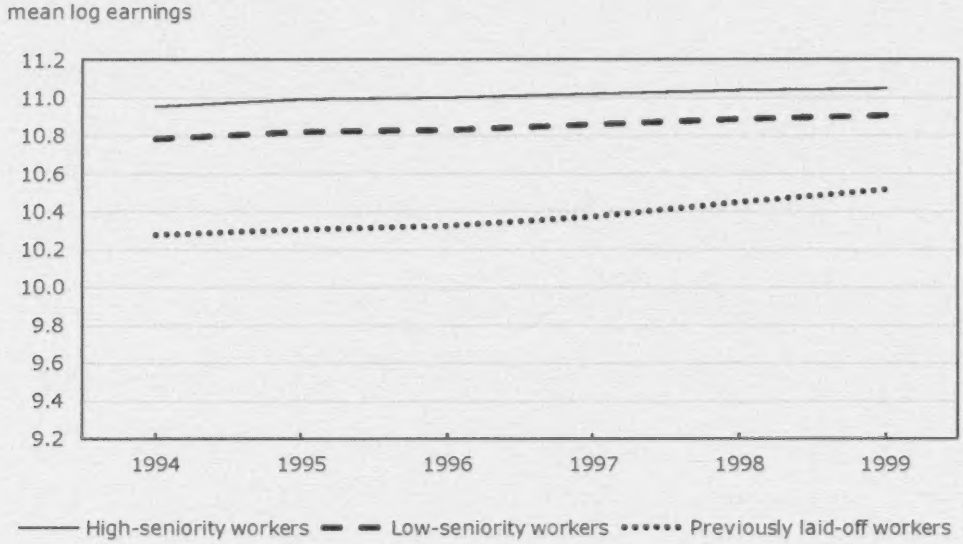
Mean log earnings of control group 1, 1994 to 1999 — Men aged 36 to 45 in 1999



Source: Statistics Canada, Longitudinal Worker File.

Chart 21

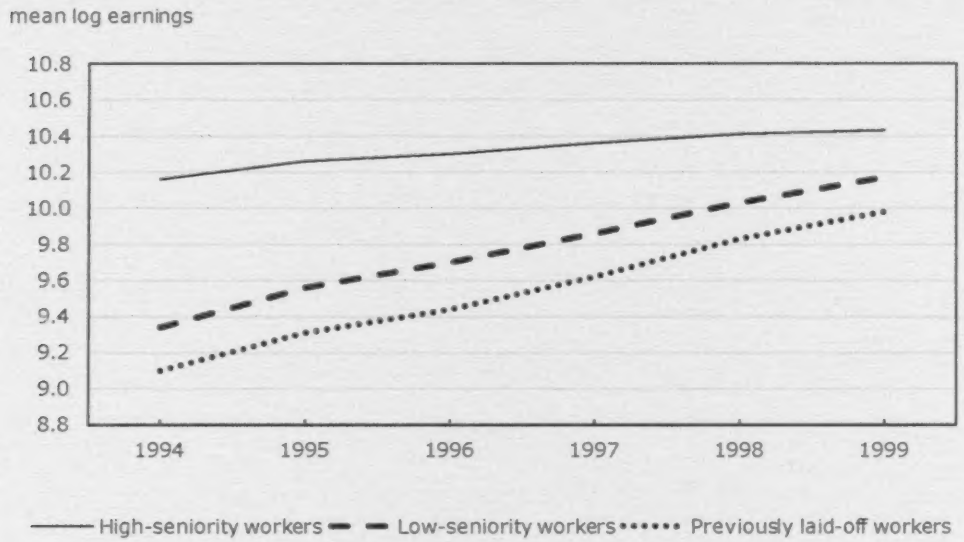
Mean log earnings of control group 1, 1994 to 1999 — Men aged 46 to 55 in 1999



Source: Statistics Canada, Longitudinal Worker File.

Chart 22

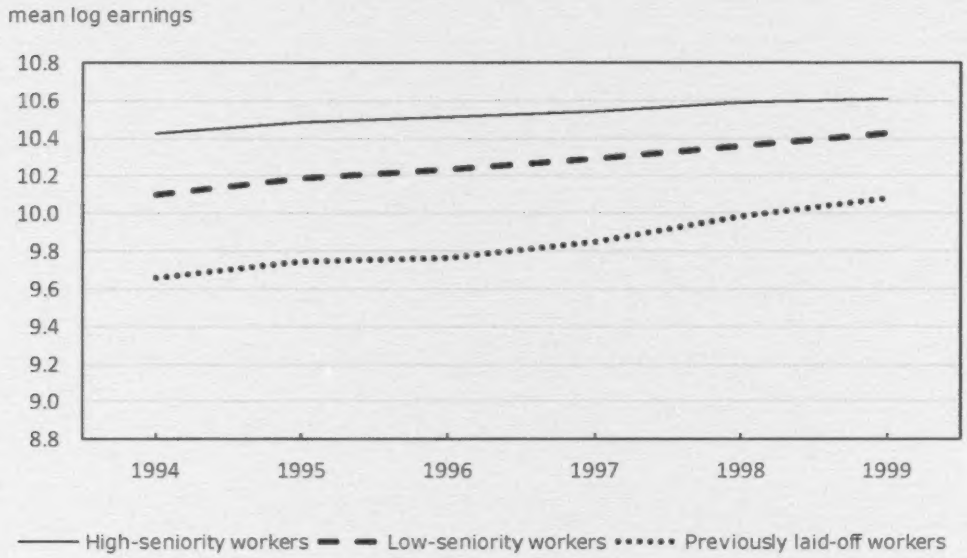
Mean log earnings of control group 1, 1994 to 1999 — Women aged 21 to 35 in 1999



Source: Statistics Canada, Longitudinal Worker File.

Chart 23

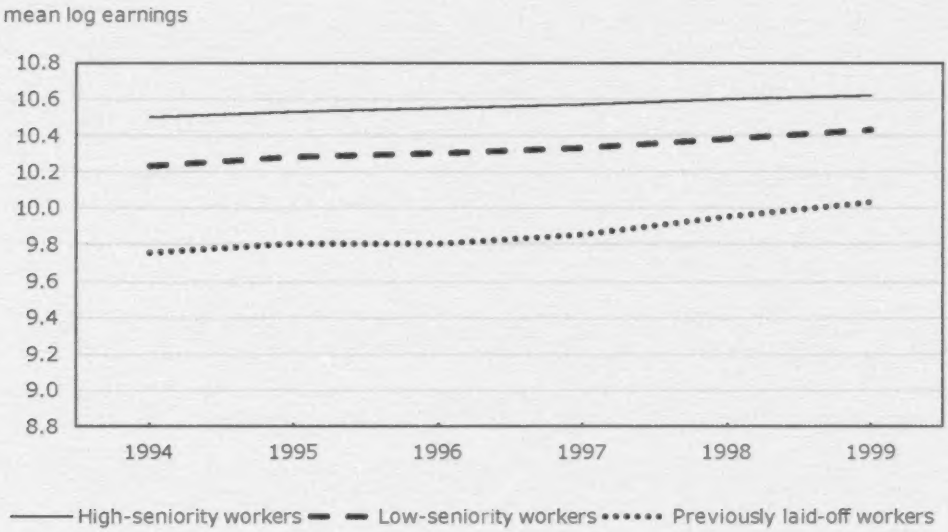
Mean log earnings of control group 1, 1994 to 1999 — Women aged 36 to 45 in 1999



Source: Statistics Canada, Longitudinal Worker File.

Chart 24

Mean log earnings of control group 1, 1994 to 1999 — Women aged 46 to 55 in 1999



Source: Statistics Canada, Longitudinal Worker File.

4 Regression results

4.1 Workers with positive earnings in all years following job loss

To estimate the *earnings losses* incurred by various groups, equation (1) is first estimated for high-attachment laid-off workers who had positive earnings in all years following job loss, i.e., between 1990 and 1998 or between 2000 and 2008.

Two specifications of equation (1) are considered, one where the dependent variable—annual earnings—is in levels and one where it is in logs. Results from the levels models are presented as proportional losses, calculated relative to the average earnings of the control group between 1995 and 1998 or between 2005 and 2008—five years after the first layoff experienced by the treatment group.[24] The estimated earnings losses experienced by men and women five years after job loss are reported in Tables 5 and 6, respectively.

For both reference periods and both functional forms, high-seniority men and women aged 36 to 55 had earnings losses of at least 13%.[25] This result is important for two reasons: first, it confirms the well-established finding that many high-seniority displaced workers experience substantial and sustained earnings losses during periods of relatively slack labour markets; and, second, it shows that the earnings losses experienced by these displaced workers are substantial even during expansionary periods.

24. The corresponding results from log models are coefficients representing the difference in log earnings between the laid-off workers and workers in the control group, which are approximate proportional losses in earnings.
25. This number equals the antilog of -0.14 minus 1 (all times 100), where -0.14 is the coefficient for the fifth-year post-displacement dummy for women aged 36 to 45 displaced during the early 2000s and is obtained from log earnings models that use control group 1 (Table 6).

Table 5

Estimated earnings losses five years after displacement — Men with stable labour market attachment prior to job loss and positive earnings in all years following job loss

	1990 to 1993			2000 to 2003		
	High-seniority workers	Low-seniority workers	Previously laid-off workers	High-seniority workers	Low-seniority workers	Previously laid-off workers
	proportion					
Aged 21 to 35						
Control group 1						
Annual earnings	-0.14 ***	-0.21 ***	-0.19 ***	-0.13 ***	-0.17 ***	-0.10 **
Natural logarithm of annual earnings	-0.16 ***	-0.21 ***	-0.22 ***	-0.07 ***	-0.09 ***	-0.11 ***
Control group 2						
Annual earnings	-0.14 ***	-0.21 ***	-0.19 ***	-0.11 ***	-0.17 ***	-0.11 ***
Natural logarithm of annual earnings	-0.16 ***	-0.21 ***	-0.23 ***	-0.05 **	-0.07 ***	-0.11 ***
Aged 36 to 45						
Control group 1						
Annual earnings	-0.16 ***	-0.20 ***	-0.17 ***	-0.16 ***	-0.20 ***	-0.08 ***
Natural logarithm of annual earnings	-0.23 ***	-0.21 ***	-0.20 ***	-0.15 ***	-0.13 ***	-0.06 ***
Control group 2						
Annual earnings	-0.18 ***	-0.20 ***	-0.18 ***	-0.16 ***	-0.21 ***	-0.09 ***
Natural logarithm of annual earnings	-0.24 ***	-0.23 ***	-0.22 ***	-0.15 ***	-0.14 ***	-0.07 ***
Aged 46 to 55						
Control group 1						
Annual earnings	-0.18 ***	-0.19 ***	-0.17 ***	-0.20 ***	-0.20 ***	-0.02 †
Natural logarithm of annual earnings	-0.25 ***	-0.20 ***	-0.24 ***	-0.21 ***	-0.11 ***	-0.03 †
Control group 2						
Annual earnings	-0.19 ***	-0.20 ***	-0.19 ***	-0.22 ***	-0.18 ***	-0.03 **
Natural logarithm of annual earnings	-0.27 ***	-0.23 ***	-0.26 ***	-0.23 ***	-0.12 ***	-0.04 *

†p<0.10; *p<0.05; **p<0.01; ***p<0.001

Note: The treatment group consists of laid-off men with stable labour market attachment prior to job loss and with positive wages and salaries in all years following job loss.

Source: Statistics Canada, Longitudinal Worker File.

Table 6

Estimated earnings losses five years after displacement — Women with stable labour market attachment prior to job loss and positive earnings in all years following job loss

	1990 to 1993			2000 to 2003		
	High-seniority workers	Low-seniority workers	Previously laid-off workers	High-seniority workers	Low-seniority workers	Previously laid-off workers
	proportion					
Aged 21 to 35						
Control group 1						
Annual earnings	-0.11 ***	-0.13 ***	-0.16 ***	-0.11 ***	-0.11 ***	-0.10 ***
Natural logarithm of annual earnings	-0.12 ***	-0.11 ***	-0.15 ***	-0.05 *	-0.02	-0.03 †
Control group 2						
Annual earnings	-0.11 ***	-0.14 ***	-0.18 ***	-0.10 ***	-0.11 ***	-0.11 ***
Natural logarithm of annual earnings	-0.12 ***	-0.11 ***	-0.17 ***	-0.04	0.00	-0.02
Aged 36 to 45						
Control group 1						
Annual earnings	-0.14 ***	-0.15 ***	-0.22 ***	-0.16 ***	-0.15 ***	-0.14 ***
Natural logarithm of annual earnings	-0.18 ***	-0.15 ***	-0.24 ***	-0.14 ***	-0.03	-0.09 ***
Control group 2						
Annual earnings	-0.15 ***	-0.17 ***	-0.24 ***	-0.16 ***	-0.15 ***	-0.15 ***
Natural logarithm of annual earnings	-0.19 ***	-0.18 ***	-0.28 ***	-0.15 ***	-0.03	-0.09 ***
Aged 46 to 55						
Control group 1						
Annual earnings	-0.15 ***	-0.15 ***	-0.22 ***	-0.14 ***	-0.07 ***	-0.13 ***
Natural logarithm of annual earnings	-0.21 ***	-0.16 ***	-0.27 ***	-0.15 ***	-0.01	-0.08 **
Control group 2						
Annual earnings	-0.15 ***	-0.18 ***	-0.24 ***	-0.14 ***	-0.08 ***	-0.14 ***
Natural logarithm of annual earnings	-0.22 ***	-0.20 ***	-0.30 ***	-0.16 ***	-0.01	-0.09 ***

†p<0.10; *p<0.05; **p<0.01; ***p<0.001

Note: The treatment group consists of laid-off women with stable labour market attachment prior to job loss and with positive wages and salaries in all years following job loss.

Source: Statistics Canada, Longitudinal Worker File.

While high-seniority workers incur larger *earnings declines* than low-seniority workers (Charts 1 to 12), they do not necessarily incur larger *earnings losses.*[26] When one considers all age groups and both functional forms, there is no evidence that low-seniority men have *systematically* lower earnings losses than high-seniority men, with this the case in both periods considered. The same conclusion holds for low-seniority women, although only during the higher-unemployment period of the 1990s. These results provide strong evidence that sustained earnings losses are not limited to high-seniority workers. Indeed, low-seniority men aged 36 to 55 incurred losses of at least 10% in both periods, and their female counterparts experienced losses of at least 14% during the 1990s.

Tables 5 and 6 also show that conclusions as to whether earnings losses of high- and low-seniority men differ between the two reference periods depend on model specification. Versions of equation (1) that use log earnings as the dependent variable yield smaller earnings losses among high- and low-seniority workers in the 2000s than in the 1990s, while this is generally not the case when earnings levels are used as the dependent variable. For example, among low-seniority workers, earnings losses were 8-percentage-points to 17-percentage-points smaller in the 2000s than the 1990s when measured in terms of log earnings,[27] but were only 1-percentage-point to 2-percentage-points smaller when measured in terms of earnings levels. Similarly, among high-seniority workers, earnings losses were 4-percentage-points to 10-percentage-points smaller in the 2000s than in the 1990s when measured in terms of log earnings, but were less than 2-percentage-points smaller when measured in terms of earnings levels. Hence, these results are ambiguous as to the extent to which low- and high-seniority workers experienced better earnings outcomes following displacement in the tighter labour markets of the early 2000s than in the slack labour markets of the early 1990s. This is the case for both men and women and for most age groups.[28]

In contrast, whether measured in terms of log earnings or earnings levels, the earnings losses experienced by previously laid-off workers were unambiguously smaller during the 2000s than during the 1990s. Specifically, earnings losses were 11-percentage-points to 20-percentage-points smaller in the 2000s than in the 1990s when measured in terms of log earnings and 6-percentage-points to 16-percentage-points smaller when measured in terms of earnings levels. Again, this is the case for both men and women and for all age groups.

4.2 Other high-attachment displaced workers

The results above are limited to laid-off workers who managed to have positive earnings in all years following job loss (up to the end of the observation period). Tables 7 and 8 show earnings losses of high-attachment displaced workers who: *(a)* had no earnings in some post-displacement years; but *(b)* had positive earnings at the end of the observation period.[29] The latter restriction was imposed to make sure that these displaced workers had not emigrated, fully retired, or died by the end of the period.[30] The control groups used in these tables are identical to those used in Tables 5 and 6. To allow for the absence of earnings in some years (coded as zero earnings), the dependent variable is in levels.

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26. Readers are reminded that earnings declines are defined as the observed difference between average earnings received in the years before and after layoff while earnings losses are defined as the difference between earnings received after layoff and a reasonable approximation of a counterfactual earnings profile that the workers would have followed had they not been laid off.
27. The estimated differences in log points are converted into percentage-point differences by using the antilog of the differences in log points minus 1.
28. Low-seniority women aged 46 to 55 are the one exception to the pattern, as both log earnings and earnings levels suggest smaller earnings losses in the 2000s for this group.
29. For the 1990-to-1993 (2000-to-2003) reference period, the end of the observation period is 1998 (2008).
30. This additional restriction is necessary since the LWF contains no information on international emigration and no detailed information on retirement and death. It reduces the population of high-attachment displaced workers who do not have positive earnings in all years following job loss by between 55% and 60%.

Table 7

Estimated earnings losses five years after displacement — Men with no earnings in some years following job loss but with positive earnings at the end of the observation period

	1990 to 1993			2000 to 2003		
	High-seniority workers	Low-seniority workers	Previously laid-off workers	High-seniority workers	Low-seniority workers	Previously laid-off workers
	proportion					
Aged 21 to 35						
Control group 1	-0.46 ***	-0.52 ***	-0.54 ***	-0.45 ***	-0.46 ***	-0.53 ***
Control group 2	-0.45 ***	-0.52 ***	-0.54 ***	-0.43 ***	-0.45 ***	-0.53 ***
Aged 36 to 45						
Control group 1	-0.47 ***	-0.47 ***	-0.45 ***	-0.41 ***	-0.47 ***	-0.44 ***
Control group 2	-0.47 ***	-0.47 ***	-0.46 ***	-0.41 ***	-0.47 ***	-0.44 ***
Aged 46 to 55						
Control group 1	-0.45 ***	-0.39 ***	-0.44 ***	-0.50 ***	-0.46 ***	-0.40 ***
Control group 2	-0.46 ***	-0.41 ***	-0.45 ***	-0.51 ***	-0.46 ***	-0.40 ***

†p<0.10; *p<0.05; **p<0.01; ***p<0.001

Notes: The treatment group consists of laid-off men with stable labour market attachment prior to job loss who had no earnings in some years following job loss but had positive earnings at the end of the observation period. For the reference period 1990 to 1993 (2000 to 2003), the end of the observation period is 1998 (2008).

Source: Statistics Canada, Longitudinal Worker File.

Table 8

Estimated earnings losses five years after displacement — Women with no earnings in some years following job loss but with positive earnings at the end of the observation period

	1990 to 1993			2000 to 2003		
	High-seniority workers	Low-seniority workers	Previously laid-off workers	High-seniority workers	Low-seniority workers	Previously laid-off workers
	proportion					
Aged 21 to 35						
Control group 1	-0.48 ***	-0.56 ***	-0.54 ***	-0.43 ***	-0.49 ***	-0.51 ***
Control group 2	-0.47 ***	-0.55 ***	-0.55 ***	-0.41 ***	-0.48 ***	-0.50 ***
Aged 36 to 45						
Control group 1	-0.42 ***	-0.47 ***	-0.53 ***	-0.49 ***	-0.43 ***	-0.43 ***
Control group 2	-0.42 ***	-0.48 ***	-0.55 ***	-0.48 ***	-0.43 ***	-0.43 ***
Aged 46 to 55						
Control group 1	-0.44 ***	-0.49 ***	-0.55 ***	-0.52 ***	-0.48 ***	-0.51 ***
Control group 2	-0.44 ***	-0.50 ***	-0.56 ***	-0.52 ***	-0.48 ***	-0.51 ***

†p<0.10; *p<0.05; **p<0.01; ***p<0.001

Notes: The treatment group consists of laid-off women with stable labour market attachment prior to job loss who had no earnings in some years following job loss but had positive earnings at the end of the observation period. For the reference period 1990 to 1993 (2000 to 2003), the end of the observation period is 1998 (2008).

Source: Statistics Canada, Longitudinal Worker File.

The results indicate that high-attachment laid-off workers who had no earnings in some post-displacement years experience major earnings losses: five years after their being laid off, their earnings losses generally amount to at least 40% of the earnings of workers in the control group. This finding holds for men and women of all ages and for both periods. It confirms that focusing solely on the earnings losses of displaced workers with positive earnings in all years following job loss leads one to underestimate the financial costs of job displacement.

4.3 Layoffs in firm closures versus other layoffs

Ideally, one would like to distinguish layoffs in firm closures from mass layoffs and layoffs occurring on an individual basis.[31] The current version of the LWF does not facilitate this. Consequently, this section compares the earnings losses of workers displaced in firm closures, on the one hand, with the earnings losses of the remaining laid-off workers, i.e., workers displaced in mass layoffs or on an individual basis, on the other hand. The question asked is the following: do workers laid off in firm closures experience smaller long-term earnings losses than do other laid-off workers?

Using an augmented version of equation (1) that includes interaction terms between displacement indicators and a firm-closure indicator, Tables 9 and 10 answer this question for men for the 1990-to-1993 and 2000-to-2003 reference periods, respectively.[32] For the 1990-to-1993 period—characterized by higher unemployment rates—there is virtually no evidence that men laid off in firm closures experience smaller earnings losses than other laid-off workers. Among men aged 45 or less, none of the interaction terms between the fifth-year post-displacement indicator and the firm-closure indicator are positive; this suggests that earnings losses among workers laid off in firm closures are not smaller than those among other laid-off workers (Table 9). Among men aged 46 to 55, the only statistically significant interaction terms are negative, pointing to *larger* losses among employees laid off in firm closures.

For the 2000-to-2003 period, characterized by lower unemployment rates, all interaction terms observed for men aged 45 or less are, with a few exceptions, not positive (Table 10). In the four instances where these interaction terms are positive, they are quantitatively and statistically insignificant. Since men aged 45 or less account for 83% of all high-attachment males laid off between 2000 and 2003 and with positive earnings in all years following job loss, the numbers in Table 10 convey the same message as those of Table 9: for most high-attachment laid-off males with positive post-displacement earnings, there is no evidence—whatever reference period is considered—that employees laid off in firm closures experience smaller long-term earnings losses than other laid-off workers.[33]

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31. Following the seminal work of Gibbons and Katz (1991), this would allow one to answer the following question: do workers laid off in firm closures and mass layoffs experience smaller earnings declines than workers laid off on an individual basis? Gibbons and Katz (1991) argued that workers laid off in plant closings or firm closures are likely to suffer smaller earnings declines than other workers since job loss among the former group conveys no information to prospective employers about (low) worker quality. The evidence on this issue is mixed. Both Gibbons and Katz (1991) and Doiron (1995) provided evidence consistent with this adverse selection hypothesis. However, Stevens (1997) found that, six or more years after job loss, workers displaced in plant closings and other laid-off workers experience very similar earnings losses (roughly 9%). In addition, Krashinsky (2002) presented evidence that the smaller earnings declines observed among workers displaced in plant closings result mainly from an employer size effect: workers displaced in plant closures are predominantly employed in relatively small establishments and, thus, will experience smaller earnings declines simply because they were paid wages lower than those of other laid-off workers prior to displacement.
32. The treatment group used in Tables 9 and 10 is identical to that used in Tables 5 and 6, i.e., it consists of laid-off men with stable labour market attachment prior to job loss and positive earnings in all years following job loss. The control groups are identical across these tables as well.
33. While the interaction terms are positive among men aged 46 to 55, none of them are statistically significant at conventional levels.

Table 9

Earnings losses of men five years after displacement — Firm closures versus other layoffs, 1990 to 1993

	High-seniority workers	Low-seniority workers	Previously laid-off workers
		proportion	
Aged 21 to 35			
Control group 1			
Annual earnings			
No firm closure	-0.14 ***	-0.20 ***	-0.18 ***
Firm closure interaction	-0.01	-0.03 †	-0.02
Natural logarithm of annual earnings			
No firm closure	-0.16 ***	-0.20 ***	-0.22 ***
Firm closure interaction	-0.03	-0.07 *	-0.03
Control group 2			
Annual earnings			
No firm closure	-0.14 ***	-0.20 ***	-0.19 ***
Firm closure interaction	-0.01	-0.03 †	-0.02 †
Natural logarithm of annual earnings			
No firm closure	-0.16 ***	-0.20 ***	-0.23 ***
Firm closure interaction	-0.03	-0.07 *	-0.03
Aged 36 to 45			
Control group 1			
Annual earnings			
No firm closure	-0.17 ***	-0.20 ***	-0.16 ***
Firm closure interaction	0.00	0.00	-0.02
Natural logarithm of annual earnings			
No firm closure	-0.23 ***	-0.21 ***	-0.20 ***
Firm closure interaction	0.00	-0.04	-0.02
Control group 2			
Annual earnings			
No firm closure	-0.18 ***	-0.20 ***	-0.17 ***
Firm closure interaction	0.00	0.00	-0.02
Natural logarithm of annual earnings			
No firm closure	-0.24 ***	-0.23 ***	-0.22 ***
Firm closure interaction	0.00	-0.04	-0.02
Aged 46 to 55			
Control group 1			
Annual earnings			
No firm closure	-0.18 ***	-0.19 ***	-0.16 ***
Firm closure interaction	-0.01	0.02	-0.05
Natural logarithm of annual earnings			
No firm closure	-0.26 ***	-0.21 ***	-0.22 ***
Firm closure interaction	0.04	0.08	-0.11 *
Control group 2			
Annual earnings			
No firm closure	-0.19 ***	-0.20 ***	-0.18 ***
Firm closure interaction	-0.01	0.02	-0.05
Natural logarithm of annual earnings			
No firm closure	-0.28 ***	-0.24 ***	-0.25 ***
Firm closure interaction	0.04	0.08	-0.11 *

†p<0.10; *p<0.05; **p<0.01; ***p<0.001

Note: The treatment group consists of laid-off men with stable labour market attachment prior to job loss who had positive wages and salaries in all years following job loss.

Source: Statistics Canada, Longitudinal Worker File.

Table 10

Earnings losses of men five years after displacement — Firm closures versus other layoffs, 2000 to 2003

	High-seniority workers	Low-seniority workers	Previously laid-off workers
		proportion	
Aged 21 to 35			
Control group 1			
Annual earnings			
No firm closure	-0.13 ***	-0.17 ***	-0.10 *
Firm closure interaction	0.00	0.01	-0.09 *
Natural logarithm of annual earnings			
No firm closure	-0.07 ***	-0.09 ***	-0.11 ***
Firm closure interaction	-0.01	-0.05	-0.05 *
Control group 2			
Annual earnings			
No firm closure	-0.11 ***	-0.17 ***	-0.11 **
Firm closure interaction	0.00	0.01	-0.09 *
Natural logarithm of annual earnings			
No firm closure	-0.05 **	-0.07 ***	-0.11 ***
Firm closure interaction	-0.01	-0.05	-0.06 *
Aged 36 to 45			
Control group 1			
Annual earnings			
No firm closure	-0.15 ***	-0.20 ***	-0.07 ***
Firm closure interaction	-0.04 *	0.00	-0.04 *
Natural logarithm of annual earnings			
No firm closure	-0.15 ***	-0.13 ***	-0.06 ***
Firm closure interaction	0.01	-0.02	0.00
Control group 2			
Annual earnings			
No firm closure	-0.15 ***	-0.21 ***	-0.08 ***
Firm closure interaction	-0.04 *	0.00	-0.04 *
Natural logarithm of annual earnings			
No firm closure	-0.16 ***	-0.13 ***	-0.07 ***
Firm closure interaction	0.01	-0.02	0.00
Aged 46 to 55			
Control group 1			
Annual earnings			
No firm closure	-0.21 ***	-0.20 ***	-0.02 †
Firm closure interaction	0.02	0.01	0.02
Natural logarithm of annual earnings			
No firm closure	-0.22 ***	-0.12 ***	-0.03 *
Firm closure interaction	0.05	0.05	0.05
Control group 2			
Annual earnings			
No firm closure	-0.22 ***	-0.19 ***	-0.03 **
Firm closure interaction	0.02	0.01	0.02
Natural logarithm of annual earnings			
No firm closure	-0.24 ***	-0.13 ***	-0.04 **
Firm closure interaction	0.05	0.05	0.05

†p<0.10; *p<0.05; **p<0.01; ***p<0.001

Note: The treatment group consists of laid-off men with stable labour market attachment prior to job loss who had positive wages and salaries in all years following job loss.

Source: Statistics Canada, Longitudinal Worker File.

The same conclusion holds for women. Of all statistically significant interaction terms shown in Tables 11 and 12 among women aged 45 or less (82% or more of all high-attachment women laid off in a given reference period and with positive earnings in all years following job loss), none are positive. The only statistically significant positive interaction term is found among high-seniority women aged 46 to 55 laid off during the 2000-to-2003 reference period. However, this group represents a minority (7%) of all high-attachment women laid off during that period and having positive earnings in all years following job loss.

Overall, these results provide no evidence that workers laid off in firm closures experience smaller long-term earnings losses than other laid-off workers.[34]

4.4 Discussion

Which groups of high-attachment workers experience substantial and persistent earnings losses? The evidence presented above sheds considerable light on this question by providing the following set of stylized facts.

First, substantial and sustained earnings losses are not limited to high-seniority workers. This is evidenced by the fact that: *(a)* low-seniority men in all age groups experienced long-term earnings losses of about 20% during the 1990s; and *(b)* low-seniority men aged 36 to 55 experienced earnings losses ranging from 10% to 21% during the 2000s (Table 5).

Second, substantial and persistent earnings losses are not limited to older workers, at least during periods of slack labour markets. Regardless of employment trajectory prior to job loss, both younger and older workers experienced significant losses during the 1990s. For the 2000s, the magnitude of the earnings losses incurred by young workers is sensitive to functional form; thus, a greater degree of uncertainty surrounds this issue.

Third, the degree to which long-term earnings losses of men increase with age depends on individuals' employment trajectories prior to job loss. In both reference periods, high-seniority men aged 46 to 55 displayed larger losses than their counterparts aged 21 to 35 (Table 5). However, this age-related difference in earnings losses is much smaller or non-existent among low-seniority men and previously laid-off men. Among women, high-seniority workers aged 46 to 55 also displayed larger losses than their counterparts aged 21 to 35 in both reference periods (Table 6). In fact, during the 1990s, fairly similar age-related differences in long-term earnings losses of women were observed across employment trajectories prior to job loss. In contrast, during the 2000s, low-seniority women aged 46 to 55 had earnings losses no larger than those of low-seniority women aged 21 to 35.

Fourth, the earnings losses experienced by previously laid-off workers were unambiguously smaller during the 2000s than during the 1990s, this being evident when either log earnings or earnings levels are considered. In contrast, the comparison of earnings losses experienced by low- and high-seniority workers in the 1990s and 2000s is sensitive to the functional form that is used. Earnings losses of these groups were smaller in the 2000s than in the 1990s when measured in terms of log earnings, but were not much different when measured in terms of earnings levels. Hence, the data do not provide clear evidence of whether low- and high-seniority displaced workers experience smaller earnings losses during periods of tight, rather than slack, labour market conditions.

34. Admittedly, this does not rule out the possibility that workers laid off in firm closures might experience smaller long-term earnings losses than workers laid off on an individual basis.

Table 11

Earnings losses of women five years after displacement — Firm closures versus other layoffs, 1990 to 1993

	High-seniority workers	Low-seniority workers	Previously laid-off workers
		proportion	
Aged 21 to 35			
Control group 1			
Annual earnings			
No firm closure	-0.12 ***	-0.13 ***	-0.16 ***
Firm closure interaction	0.04	-0.06 ***	-0.06 **
Natural logarithm of annual earnings			
No firm closure	-0.13 ***	-0.09 ***	-0.13 ***
Firm closure interaction	0.07	-0.11 **	-0.11 *
Control group 2			
Annual earnings			
No firm closure	-0.12 ***	-0.13 ***	-0.17 ***
Firm closure interaction	0.04	-0.06 ***	-0.06 **
Natural logarithm of annual earnings			
No firm closure	-0.13 ***	-0.10 ***	-0.16 ***
Firm closure interaction	0.07	-0.12 **	-0.11 *
Aged 36 to 45			
Control group 1			
Annual earnings			
No firm closure	-0.14 ***	-0.14 ***	-0.21 ***
Firm closure interaction	-0.01	-0.05 *	-0.05 †
Natural logarithm of annual earnings			
No firm closure	-0.17 ***	-0.14 ***	-0.22 ***
Firm closure interaction	-0.07	-0.04	-0.09
Control group 2			
Annual earnings			
No firm closure	-0.14 ***	-0.16 ***	-0.23 ***
Firm closure interaction	-0.01	-0.05 *	-0.05 †
Natural logarithm of annual earnings			
No firm closure	-0.18 ***	-0.17 ***	-0.27 ***
Firm closure interaction	-0.07	-0.05	-0.09
Aged 46 to 55			
Control group 1			
Annual earnings			
No firm closure	-0.15 ***	-0.15 ***	-0.20 ***
Firm closure interaction	0.02	-0.02	-0.09
Natural logarithm of annual earnings			
No firm closure	-0.23 ***	-0.17 ***	-0.24 ***
Firm closure interaction	0.08	0.02	-0.17
Control group 2			
Annual earnings			
No firm closure	-0.16 ***	-0.18 ***	-0.22 ***
Firm closure interaction	0.02	-0.02	-0.08
Natural logarithm of annual earnings			
No firm closure	-0.24 ***	-0.21 ***	-0.27 ***
Firm closure interaction	0.08	0.03	-0.17

†p<0.10; *p<0.05; **p<0.01; ***p<0.001

Note: The treatment group consists of laid-off women with stable labour market attachment prior to job loss who had positive wages and salaries in all years following job loss.

Source: Statistics Canada, Longitudinal Worker File.

Table 12

Earnings losses of women five years after displacement — Firm closures versus other layoffs, 2000 to 2003

	High-seniority workers	Low-seniority workers	Previously laid-off workers
		proportion	
Aged 21 to 35			
Control group 1			
Annual earnings			
No firm closure	-0.09 ***	-0.11 ***	-0.09 ***
Firm closure interaction	-0.10 ***	-0.05 *	-0.10 ***
Natural logarithm of annual earnings			
No firm closure	-0.03	-0.01	-0.02
Firm closure interaction	-0.15 *	-0.04	-0.15 **
Control group 2			
Annual earnings			
No firm closure	-0.09 ***	-0.11 ***	-0.10 ***
Firm closure interaction	-0.10 ***	-0.04 *	-0.10 ***
Natural logarithm of annual earnings			
No firm closure	-0.02	0.01	-0.01
Firm closure interaction	-0.15 *	-0.04	-0.15 **
Aged 36 to 45			
Control group 1			
Annual earnings			
No firm closure	-0.15 ***	-0.15 ***	-0.14 ***
Firm closure interaction	-0.03	0.01	-0.05 *
Natural logarithm of annual earnings			
No firm closure	-0.14 ***	-0.04 †	-0.09 ***
Firm closure interaction	0.00	0.05	-0.02
Control group 2			
Annual earnings			
No firm closure	-0.15 ***	-0.15 ***	-0.15 ***
Firm closure interaction	-0.03	0.01	-0.04 *
Natural logarithm of annual earnings			
No firm closure	-0.15 ***	-0.03 †	-0.09 ***
Firm closure interaction	0.00	0.05	-0.02
Aged 46 to 55			
Control group 1			
Annual earnings			
No firm closure	-0.14 ***	-0.07 ***	-0.12 ***
Firm closure interaction	0.07 *	0.01	-0.06
Natural logarithm of annual earnings			
No firm closure	-0.17 ***	-0.01	-0.06 *
Firm closure interaction	0.14 *	-0.02	-0.17 **
Control group 2			
Annual earnings			
No firm closure	-0.15 ***	-0.08 ***	-0.14 ***
Firm closure interaction	0.07 *	0.01	-0.06
Natural logarithm of annual earnings			
No firm closure	-0.18 ***	-0.01	-0.07 **
Firm closure interaction	0.14 *	-0.02	-0.17 **

†p<0.10; *p<0.05; **p<0.01; ***p<0.001

Note: The treatment group consists of laid-off women with stable labour market attachment prior to job loss who had positive wages and salaries in all years following job loss.

Source: Statistics Canada, Longitudinal Worker File.

Apart from these stylized facts, the results shown in this study remind researchers of an important methodological lesson: observed average earnings changes can be a poor proxy for the average earnings losses (or foregone earnings) of displaced workers. For instance, while young men with high seniority who were laid off during the early 1990s experienced, on average, larger earnings *declines* than their low-seniority counterparts following job loss (Chart 1), high-seniority workers had smaller long-term earnings *losses* than their low-seniority counterparts (Table 5). Hence, the financial costs of job displacement, as measured by average earnings losses, can differ dramatically from observed average earnings declines. This point—which was made forcefully by Jacobson *et al.* (1993b) and Kletzer and Fairlie (2003)—is worth reiterating.[35]

5 Conclusion

Whether all groups of displaced workers in Canada who exhibit stable labour market attachment prior to job loss experience sustained earnings losses is a question that has remained unanswered to date. The reason is that many recent studies provide useful information on the long-term financial impact of job displacement, but do so for relatively narrow groups of displaced workers. As a result, it is unclear whether their findings can be generalized to the whole population of high-attachment laid-off workers. In addition, because different studies quantify long-term earnings losses by using different data sets, time intervals, and sample selection criteria, it is difficult for researchers and policy makers to assess whether differences in earnings losses reflect true differences in outcomes.

This study fills this gap and estimates the long-term earnings losses of all groups of high-attachment laid-off workers in Canada within a unified setting.

The study partitions the population of high-attachment workers into 18 subsets resulting from the interaction of three dimensions: gender, age, and employment trajectory prior to job loss. For both the 1990s and the 2000s, the study quantifies long-term earnings losses experienced by each of the 18 subsets of high-attachment workers. Furthermore, the study tests, for each of the 18 subsets considered, whether earnings losses of workers laid off in firm closures differ from those of workers displaced through other types of layoffs.

The main finding of this study is that substantial and sustained earnings losses are observed among many subsets of this population, rather than being limited to a well-defined segment of the population of high-attachment displaced workers. The magnitude of long-term earnings losses varies with age, gender, employment trajectory prior to job loss, and labour market conditions. In a non-negligible number of cases, it is also sensitive to functional form. Importantly, substantial and sustained earnings losses are not limited to high-seniority workers or to periods with relatively high unemployment rates.

The study unambiguously shows that post-displacement long-term earnings losses are smaller during periods of low, rather than high, unemployment rates for workers who had been previously laid off. Since this group represents roughly half the population of high-attachment displaced workers, this finding implies that better labour market conditions mitigate long-term earnings losses for a significant segment of displaced workers.

35. It should also be kept in mind that average earnings losses can also be a poor proxy for the earnings foregone by individual workers, as the causal impact of job displacement on workers' earnings might be heterogeneous. Whether group-specific average earnings losses, group-specific average earnings declines, or individual-specific earnings declines should be used as a metric for policies, if any, aimed at providing assistance to displaced workers is beyond the scope of this study.

However, the study also shows that both high- and low-seniority male workers aged 36 to 55 experienced long-term earnings losses of at least 10% even in the relatively tight labour market of the 2000s. Thus, while better labour market conditions are good news for many displaced workers, they do not eliminate the adverse earnings impact of job displacement for a significant number of others.

6 Appendix

6.1 Sample sizes of the control groups

Table 13
Sample sizes for various control groups

	1990 to 1993			2000 to 2003		
	High-seniority workers	Low-seniority workers	Previously laid-off workers	High-seniority workers	Low-seniority workers	Previously laid-off workers
	number of workers					
Men						
Aged 21 to 35						
Control group 1	47,282	44,538	29,051	34,106	41,726	27,681
Control group 2	40,147	29,587	19,584	27,620	25,027	16,318
Aged 36 to 45						
Control group 1	58,497	19,392	8,455	67,953	25,396	13,536
Control group 2	50,711	14,074	6,318	60,051	18,165	9,614
Aged 46 to 55						
Control group 1	25,928	7,623	3,352	43,752	12,734	6,441
Control group 2	22,815	5,564	2,649	39,056	9,566	4,785
Women						
Aged 21 to 35						
Control group 1	34,943	44,265	16,199	29,567	41,968	18,487
Control group 2	28,973	28,163	9,978	23,263	24,312	10,499
Aged 36 to 45						
Control group 1	39,549	17,878	5,505	58,200	26,400	10,203
Control group 2	34,425	12,768	3,888	49,947	18,562	6,924
Aged 46 to 55						
Control group 1	16,185	6,187	2,028	37,943	14,303	5,446
Control group 2	14,453	4,520	1,526	33,289	10,700	3,932

Source: Statistics Canada, Longitudinal Worker File.

6.2 Factors explaining differences in layoff counts

The count of individuals who experienced a layoff during the reference periods in this study—reported in Table 1—differs from the count of layoffs reported in a recent study by Chan *et al.* (2011). Several factors explain this difference. The two major factors are the following:

1. This study reports the number of *individuals* who have experienced *at least one* layoff over a four-year reference period. In contrast, the Chan *et al.* (2011) study reports the number of *layoffs*. Many workers in fact experienced multiple layoffs during the four-year reference periods in this study. Specifically, some 18% (17%) of individuals experienced two layoffs between 1990 and 1993 (2000 and 2003), while nearly 12% experienced three or more layoffs. In total, the 2.291 million (2.029 million) individuals with at least one layoff between 1990 and 1993 (2000 and 2003) experienced a total of 3.552 million (3.161 million) layoffs during this period.

2. When the age range of individuals in this study is expanded to 15-to-64 years of age (the age range in Chan *et al.* 2011) in 1989 (1999), the total number of layoffs recorded between 1990 and 1993 (2000 and 2003) rises to 4.179 million (3.909 million).

The remaining discrepancy between the counts in the two studies can be explained by the following:

- This study follows a *cohort* of individuals aged 21 to 55 in 1989 (1999) over time, while Chan *et al.* (2011) count all layoffs among individuals aged 15 to 64 in *each year*.
- Chan *et al.* (2011) employ weights to account for issued ROEs that it was not possible to match to earnings and employer information in the LWF—such records are excluded from the sample in this study, and no weights are used to account for them.
- Chan *et al.* (2011) restrict the sample to the ten Canadian provinces.
- Chan *et al.* (2011) restrict the sample to jobs with reported annual earnings of at least $500 in 1989 constant dollars.
- Observations with inconsistent age information over time were treated differently in the two studies.

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